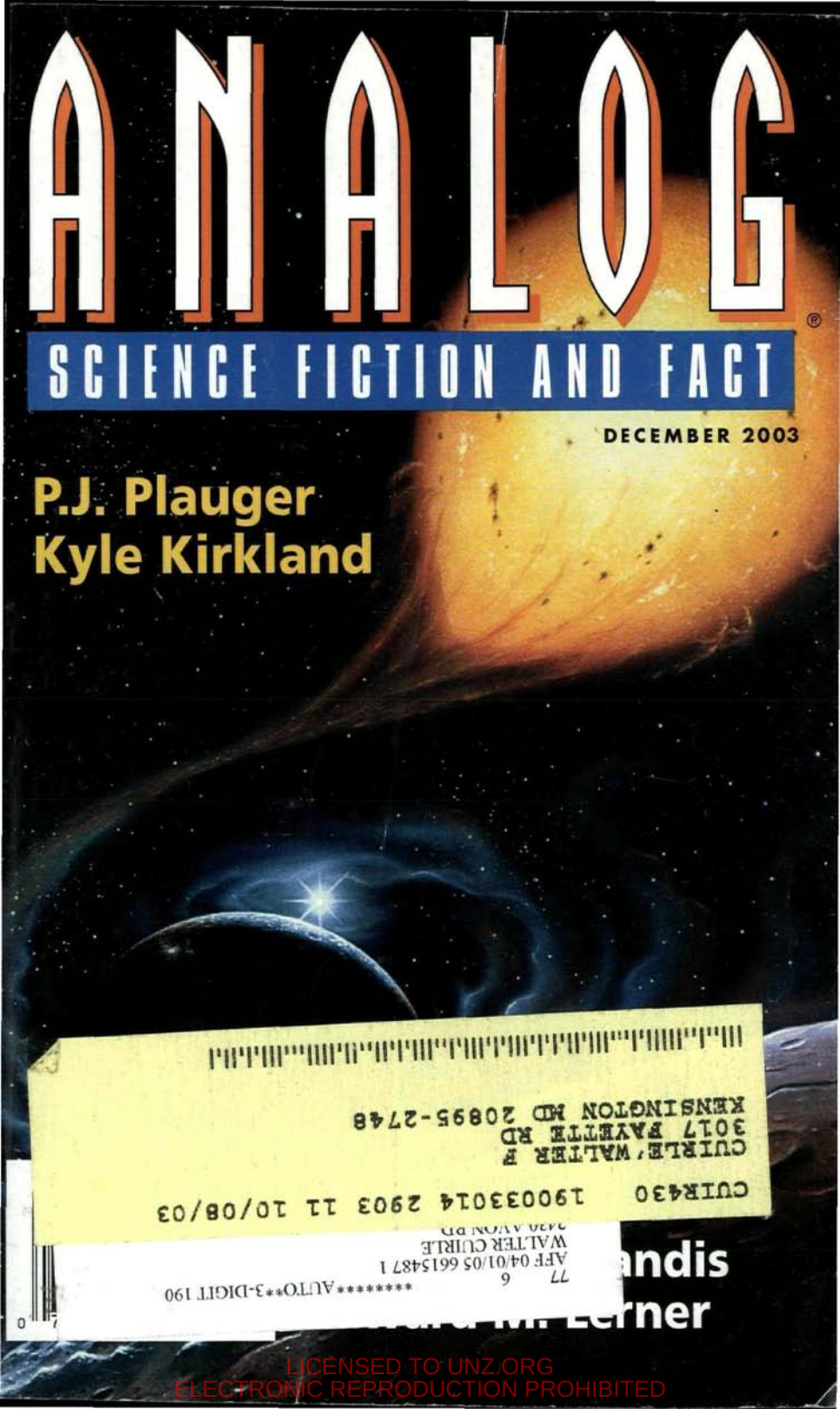
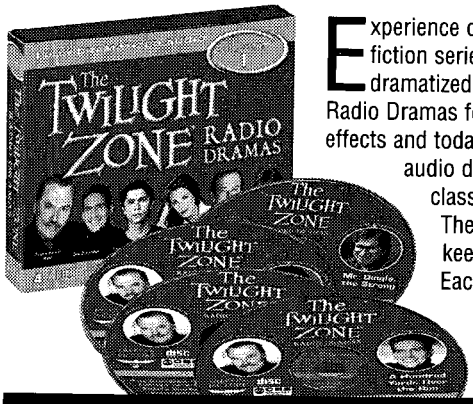


CUIR430 19003301 4 2903 11 10/08/03
CUIRLE, WALTER F
3017 FAYETTE RD
KENSINGTON MD 20895-2748

77 6
AFF 04/01/05 6615487 1
WALTER CUIRLE
2420 AVON PL
********AUTO**3-DIGIT 190

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Twilight Zone® Radio Dramas



Experience one of television's greatest science-fiction series, The Twilight Zone® - fully dramatized for AUDIO! The Twilight Zone® Radio Dramas feature a full cast, music and sound effects and today's biggest celebrities in modern audio dramas of creator Rod Serling's classic scripts. Hosted by Stacy Keach, The Twilight Zone® Radio Dramas will keep you glued to the edge of your seat. Each collection features 4 stereo recordings totalling 3.5 hours.

Regular Price $27.99 each

Buy One Collection, Take $5.00 off!
Buy Two or more, Take $12.00 off your total!

COLLECTION 1

"A Hundred Yards Over the Rim"
starring Jim Caviezel
"The Lateness of the Hour"
starring Jane Seymour
"A Kind of Stopwatch"
starring Lou Diamond Phillips
"Mr. Dingle, the Strong"
starring Tim Kazurinsky

4000 Collection 1 (Cassette)
4001 Collection 1 (CD)

COLLECTION 2

"The Thirty-Fathom Grave"
starring Blair Underwood
"The Man In the Bottle"
starring Ed Begley, Jr.
"The After Hours"
starring Kim Fields
"Night of the Meek"
starring Chris McDonald

4002 Collection 2 (Cassette)
4003 Collection 2 (CD)

COLLECTION 3

"I Am the Night - Color Me Black"
starring John Ratzenberger
"A Stop At Willoughby"
starring Chelcie Ross
"Cavender Is Coming"
starring Andrea Evans
"Escape Clause"
starring Mike Starr

4004 Collection 3 (Cassette)
4005 Collection 3 (CD)

COLLECTION 4

"The Passersby"
starring Morgan Brittany
"The Rip Van Winkle Caper"
starring Tim Kazurinsky
"Four O'Clock"
starring Stan Freberg
"The Monsters Are Due On Maple Street"
starring Frank John Hughes

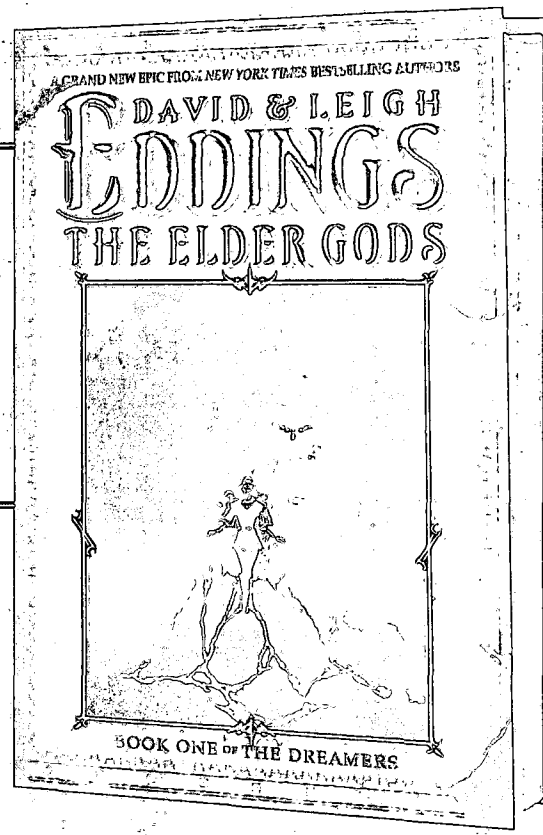
4006 Collection 4 (Cassette)
4007 Collection 4 (CD)

CALL TOLL-FREE 1-866-989-9663
Visit our website at www.twilightzoneradio.com

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

From *New York Times* bestsellers David & Leigh Eddings

A major force in fantasy has returned with an astonishing new epic.



A four book saga introducing two generations of living gods...and the impending doom that threatens them.

ON SALE OCTOBER 14th

Available in hardcover

Read an Excerpt Online at www.twbookmark.com

"An Eddings tome is a must in fantasy collections of all sizes."
—*Booklist*

"Practically everybody can find something to like in any Eddings book."
—*Chicago Sun-Times*

Only the Dreamers hold the power to change the course of history.

ART: MATT STAWICKI

ASPECT WHERE IMAGINATION KNOWS NO BOUNDS

An AOL Time Warner Book Group Company

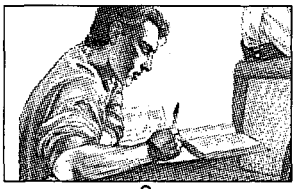
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ANALOG

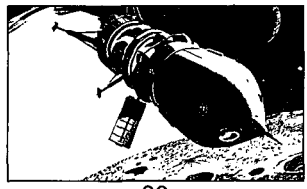
SCIENCE FICTION AND FACT

Vol. CXXIII No. 12
December 2003

Next Issue on Sale
November 18, 2003



8



90

SERIAL

MOONSTRUCK (conclusion), Edward M. Lerner ____ 90

NOVELLA

LUCKY LUKE, P.J. Plauger ____ 8

SHORT STORIES

FACES, Charles L. Harness ____ 59
VISIONS OF GINGERBREAD, Bruce Holland Rogers ____ 67
WINDINGWEED, Kyle Kirkland ____ 78

SCIENCE FACT

IF A TREE FALLS . . . OR,THE SECRET HISTORY OF
GLOBAL ENVIRONMENTAL CATASTROPHE, Catherine H. Shaffer ____ 50

SPECIAL FEATURE

THE REASON WE'RE HERE, Geoffrey A. Landis ____ 70

READER'S DEPARTMENTS

THE EDITOR'S PAGE ____ 4
IN TIMES TO COME ____ 142
THE ALTERNATE VIEW, John G. Cramer ____ 73
THE REFERENCE LIBRARY, Tom Easton ____ 132
BRASS TACKS ____ 138
UPCOMING EVENTS, Anthony Lewis ____ 144

Stanley Schmidt Editor — **Trevor Quachri** Associate Editor

Cover design by Victoria Green — Cover Art by David A. Hardy

Indicia on Page 5 — Online Chat Listing on Page 72

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

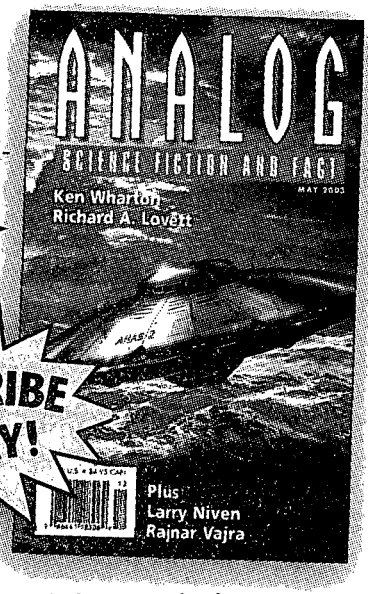
DON'T MISS AN ISSUE!

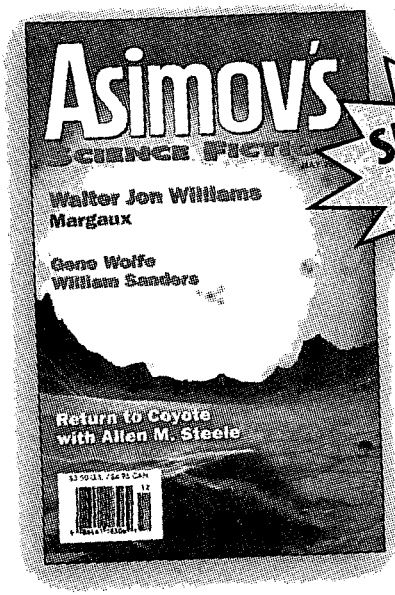
Subscribe today and have every intriguing issue of entertaining science fiction delivered direct to your door!

Analog Science Fiction and Fact

An unbeatable combination of stimulating fiction stories, provocative editorials, and fascinating articles, all solidly rooted in science fact. 1 year (12 issues*), just $32.97!

Visit **www.analogsf.com** →





SUBSCRIBE TODAY!

Asimov's Science Fiction

Novellas and short stories from the leading science fiction and fantasy writers. Plus, candid, no-holds-barred book reviews and guest editorials. 1 year (12 issues*), just $32.97!

← Visit **www.asimovs.com**

To order by charge card, call
TOLL-FREE: 1-800-220-7443 (9am - 5pm EST)

or mail your name, address, order, and payment to:

Dell Magazines Direct
6 Prowitt St., Suite S • Norwalk, CT 06855-1220

Please allow 4 to 6 weeks for delivery of your first issue. Outside U.S.A.: Add $10 per year, per subscription for shipping and handling. All orders must be paid in U.S. funds. *CT Residents: Please add 6% state sales tax to your total order.* *We publish double issues twice a year which count as four issues toward your subscription. Expires 12/31/04.

A3C-NSFSLL

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

EDITORIAL Stanley Schmidt

CHILD, VILLAGE, AND BUG

There's an old saying that, "It takes a village to raise a child." The original intent, I suspect, was to remind everyone that the entire community in which a child grows up influences *how* he or she grows up. It's not enough for that child's parents to provide a good nurturing environment; for best results, everyone in the community, including people who aren't parents at all, needs to provide positive influences and avoid harmful ones.

But what happens when the parents and the rest of the village disagree about what's best for the child—or when more than one "village" is involved?

I was reminded of these questions by two articles that appeared coincidentally in the same "Science Times" section of *The New York Times* in January 2003. The editors apparently did not intend them to be viewed as a pair, but I couldn't avoid doing so.

The first article was about a growing tendency for parents to join particular churches specifically to get a religious exemption (available in most states) allowing their children to avoid the vaccinations required for all non-exempt children before they can be admitted to schools. At least one of these churches, insofar as one can judge from the article, seems to exist for no other purpose. Others look more conventionally churchly, but the medical effect is the same. And the agencies granting the exemptions typically do not make distinctions. In at least one state, they're not allowed to. "If they have a deeply held belief," New Jersey's chief epidemiologist is quoted as saying in the article, "they get the exemption. We don't define what a deeply held belief is."

In other words, here is another case (I've talked about these before, in "Useful Illusions and Deadly Faith" [February 2003]) where mere depth of belief is treated as a strong intrinsic virtue, without regard for the objective truth, social usefulness, or any other merit (or lack

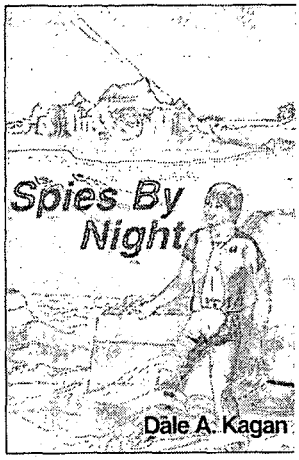
Analog Science Fiction and Fact (Astounding), Vol. CXXIII, No. 12, December 2003. ISSN 1059-2113, USPS 488-910, GST# 123054108. Published monthly except for combined January/February and July/August double issues by Dell Magazines, a division of Crosstown Publications. One-year subscription for $43.90 in the U.S.A. and possessions, in all other countries, $53.90 (GST included in Canada) payable in advance in U.S. funds. First copy of new subscription will be mailed within eight weeks of receipt of order. When reporting change of address allow 6 to 8 weeks and give new address as well as the old address as it appears on the last label. Periodical postage paid at Norwalk, CT and additional mailing offices. Canadian postage paid at Montreal, Quebec. Canada Post International Publications Mail, Product Sales Agreement No. 40012460. © 2003 by Dell Magazines, a division of Crosstown Publications, all rights reserved. Protection secured under the Universal Copyright Convention. Reproduction or use of editorial or pictorial content in any manner without express permission is prohibited. All stories in this magazine are fiction. No actual persons are designated by name or character. Any similarity is coincidental. All submissions must be accompanied by stamped self-addressed envelope, the publisher assumes no responsibility for unsolicited manuscripts or artwork.

POSTMASTER: Send change of address to: ANALOG SCIENCE FICTION AND FACT
6 Prowitt Street, Norwalk, CT 06855.

IN CANADA RETURN TO: Transcontinental Sub Dept, 525 Louis Pasteur, Boucherville, Quebec, J48 8E7
Executive Office: Penny Press, 6 Prowitt St., Norwalk, CT 06855
Editorial and Advertising: Analog Science Fiction and Fact, 475 Park Avenue South, New York, N.Y. 10016
Subscriptions: Analog Science Fiction and Fact, 6 Prowitt Street, Norwalk, CT 06855.

Printed in Canada

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



A corporate espionage story set in the future. Spies By Night.

Every one of us would like to get one up on a sibling. At General Transit, Dion Rendahl would do anything to get out of the shadow of his brother, Michael. But when the V-P asks Dion to solve the problem of corporate spies, he gets into more trouble than he could ever imagine.
Saboteurs are stealing power from the Earth Solar Platform. An engineer, Volans Mirfak, is kidnapped to Star Colony Alioth through the Infinity Field. With the banking collapse, only Alyson Dahlia Forbs, daughter of a Senator, can get Dion and Volans out of the trouble they are in.
Read chapter one at www.xlibris.com/bookstore. Mail order: 888-795-4274, Ext. 276. Amazon.com and BarnesandNoble.com. $23.
Also by Dale A. Kagan: Lanterns Over Demner: A Science Fiction Murder Mystery. Eccles has a telepathic block against ESP Forces. $21.

thereof) of *what* is deeply believed.

More about that later. For now, let's turn to the other *Times* article. This one merely cites the results of a new study—which supports several previous ones—indicating that if deaf children are going to get cochlear implants at all, they should get them very early in life: before the age of three and a half years, and optimally between one and two. There's a good medical reason for this, and in itself it seems to have nothing to do with the first article.

A cochlear implant, as you likely know, is a type of surgery that can compensate for certain types of ear damage by using implanted electronics to take over the function of damaged parts. The medical catch is that normal hearing depends not only on the proper operation of those parts, or a manmade substitute, but also on the proper development and training of the neural circuitry that processes the signal from the ear to the brain. That development and programming happens easily and well when the nervous system is still being formed anyway, but not nearly so well when it's older, well established, and harder to modify. Patients who get cochlear implants later in life typically never learn to interpret the signals from them properly, and the result makes their lives worse, not better. So the medical justification for doing cochlear implants early, if at all, is clear.

The connection with the first article I mentioned is something I had earlier heard about in several other sources: many deaf people with deaf children don't want them to have cochlear implants at all. And the question is: should they be allowed to prevent them (assuming that they're financially available)? To many hearing people, it might seem self-evident that any child who *can* be given normal hearing *should* be given normal hearing, and that depriving him or her of that opportunity amounts to cruelty or child abuse that

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

should not be allowed.

Many deaf parents don't see it that way. People without hearing experience the world in significantly different ways from the hearing, so they share a large body of experience among themselves that they don't share with hearing people (and that hearing people don't share at all). This has led to the development of an extensive deaf community with its own language (American Sign Language is *not* just English transliterated!) and a rich subculture. Many parents who have never heard don't consider lack of hearing to be a handicap, but fear that forcing hearing on their children would deprive them of their deaf cultural heritage.

So who should decide? The parents, or the village?

In the case of vaccination, parents and village agree that the child's welfare should be the primary consideration, but disagree on what that means. Members of a religious sect that opposes vaccination, whether sincerely or just to exploit a legal loophole, may have the backing of that "village." But what about the larger "village" that has abundant evidence that vaccination is the best hope of preventing scourges like smallpox? Can it afford to tolerate large numbers of people not being vaccinated, thus providing potential disease hosts and thereby endangering the rest?

You may object that if vaccination works, a few people going unvaccinated does not endanger everybody else, but it's not that simple. Few vaccines are 100% reliable, so really effective disease control requires both vaccination and prevention of exposure. There's an effect called "herd immunity," in which if a high enough percentage of a population is immune to a disease, even the non-immune members of that population are less likely to catch it because they are less likely to come in contact with others who have it. But it works the other way, too. If a high enough percentage is susceptible, even the vaccinated are more vulnerable because in a few of them the vaccine won't work, and they are more likely to be exposed.

It's true that any vaccination (or other medical procedure) will have adverse effects, rarely even severe ones, in a few people. Fear of those motivates many people who shun vaccinations. But it's also true that certain diseases, turned loose in a largely non-immune population, will cause a *lot* of adverse effects,

STANLEY SCHMIDT .....Editor
SHEILA WILLIAMS .....Executive Editor
TREVOR QUACHRI.....Associate Editor
BRIAN BIENIOWSKI.....Assistant Editor
MARY GRANT .....Editorial Assistant
VICTORIA GREEN .....Senior Art Director
JUNE LEVINE.....Associate Art Director
CAROLE DIXON.....Senior Production Manager
ABIGAIL BROWNING.....Manager, Subsidiary Rights and Marketing
SCOTT LAIS.....Contracts and Permissions
JULIA McEVOY .....Manager, Advertising Sales
BRUCE W. SHERBOW.....VP, Sales and Marketing
SANDY MARLOWE .....Circulation Services

PETER KANTER
Publisher

CHRISTINE BEGLEY
Associate Publisher

SUSAN KENDRIOSKI
Executive Director,
Art & Production

Published since 1930

First issue of Astounding
January 1930 ©

ADVERTISING REPRESENTATIVE Connie Goon, Advertising Sales Coordinator,
Tel:(212) 686-7188 ■ Fax:(212) 686-7414 (Display and Classified Advertising)
EDITORIAL CORRESPONDENCE ONLY analog@dellmagazines.com

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

frequently severe. In general, people who are capable of following a careful (read: quantitative) analysis of risks and benefits, and take the trouble to do so, agree that everybody's overall risk is greatly reduced if everybody is vaccinated. If that's true, it's reasonable to insist that everybody *be* vaccinated, granting exemptions reluctantly, if at all. As Dr. Gilbert L. Ross, medical director of the American Council on Science and Health, said in a letter commenting on the *Times* article, "Parents' rights to evade vaccinations for their school-age children stop at classmates' respiratory tracts." Of course, insisting on that, at a time when various religions are demanding exemption on the strength of "deep belief," would lead inevitably to a direct confrontation between church and state. So far most states are avoiding that by granting exemptions freely—but how long and to what extent should they continue to do so?

In the case of cochlear implants, there doesn't seem to be any problem of contagion, but there is definitely a problem of what's best for the child—and who decides. For most hearing parents with a child born deaf, it probably seems simple: give the kid hearing, and soon, so it can be done right. But what about deaf parents who can't miss hearing because they've never experienced it, and really believe that giving it to their child will not be a gift, but a deprivation of the deaf community heritage? I have no doubt that they really do want what's best for the child, though I can't help suspecting that there's also a component of fear of losing part of their closeness to the child if he or she can also form bonds outside that community.

Personally, I find it hard (though not impossible) to imagine situations in which I would be grateful for being deprived of senses or experiences I could have. Why can't such kids be raised "bilingual," active in both hearing and deaf communities and able to bridge the gap between them? Maybe we need more writers to explore questions like these, perhaps by the traditional science-fictional trick of transplanting the problem to a fictitious situation not so emotionally charged by proximity. For example, what should we do, and what might result, if somebody offered to extend our hearing range, or vision, or give us telepathy? As a starter, I might remind you of a powerful tale that appeared here back in November 1976: Spider Robinson's "By Any Other Name." But there's still plenty of thinking to be done about these kinds of questions, and the need for it has never been greater than now, when our ability to make these kinds of choices is growing by leaps and bounds. ■

I do not mind lying, but I hate inaccuracy.

—Samuel Butler

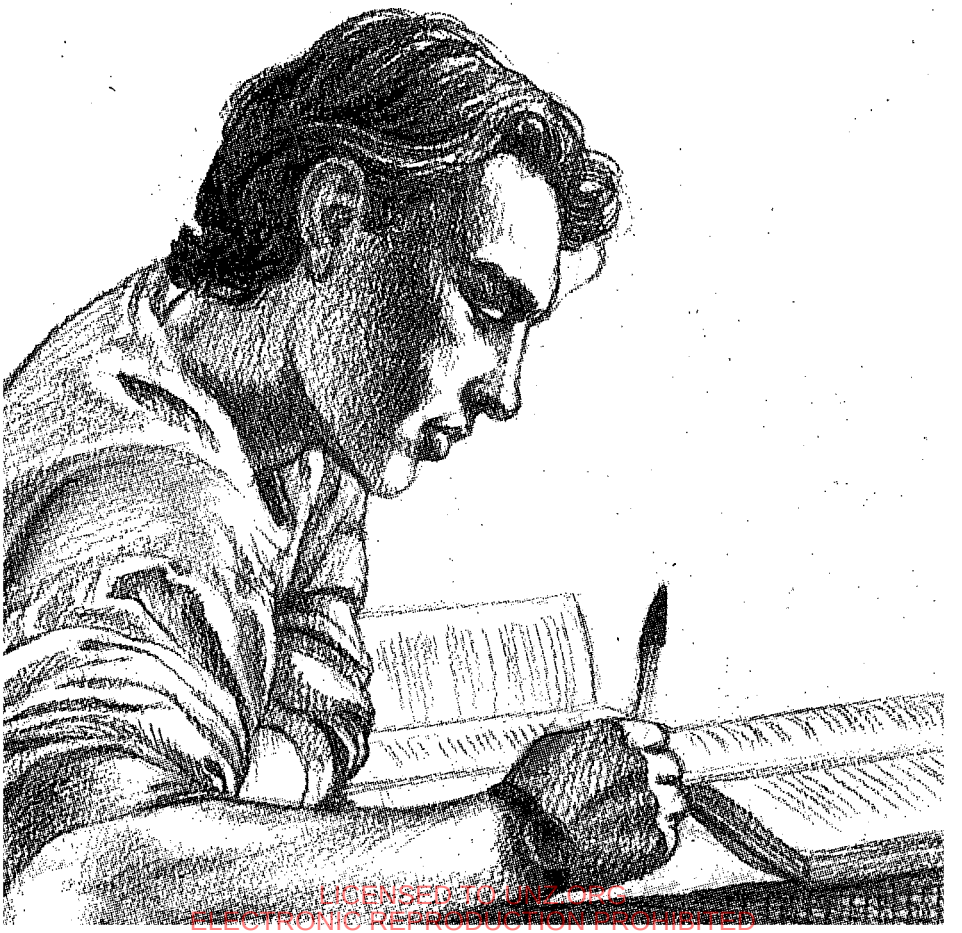
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LUCKY LUKE

P.J. Plauger

Illustration by Laurie Harden

Theirs was a relationship at once closer and more distant than any we've known. . . .



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNI CORE
ELECTRONIC REPRODUCTION PROHIBITED

Lucky didn't want to wake up, but he did. As was so often the case, the Dream of the night before was far more appealing than the prospect of the day to come. He scrunched deeper into the covers, pulled the second pillow over his forehead, hoping the added warmth would send him back to sleep. And the Dream.

But no. Chill air stung his nostrils and stirred him further into consciousness, willy-nilly. He opened his eyes. Half past six, said the glowing digits on his clock radio. Still plenty dark, as was fitting for a mid-December morning. Half an hour more until the heat came up. Jude's College did not believe in wasting warmth on dormitory rooms.

His gaze wandered to the only other source of light. Leaded glass windows framed mountains in the middle distance. Against the dark Western sky he could just make out the limestone outcroppings he knew so well, set weakly aglow by the first hint of dawn's early light.

The Sleepers, locals called them. An uninteresting pair of bumps along an uninteresting stretch of the Appalachian Mountains. And in between, a stubby irregular notch. Sleepers' Pass. An easy three-hour climb from the edge of campus, with nothing much to see on arrival, and nowhere to go for miles afterward but gullied scrubland on the far slope. A fitting birth place for Lucky Sites, professional student and dreamer extraordinaire.

He drew his knees to his chest, to husband warmth. Lucky knew that, after classes tomorrow, he would be making yet another pilgrimage to that spot. He would clear a bit more rubble from the shelter cave, looking for he knew not what. He would camp out in the cave overnight to await the precise moment of the winter solstice, half fearing and half hoping for another one of those fluky winter storms for which the Sleepers were locally infamous. And he would probably fail, once again, in his secret, lifelong quest. Then he would descend in time for his last couple of classes, and spend yet another lonely Christmas at Jude's. At least most of the assholes would be home for the holidays, tormenting younger siblings instead of him.

A hell of a way to spend my twenty-first birthday, he thought. Then, *I wonder if Luke will go there this year. Maybe he's given up hope.*

And that brought him back to the Dream.

Last night had been a good one. Mirve, her name was. Tanner's daughter and just come of age. Plump and cuddly, a little shy at her first time. But Luke was both kind and experienced. The second time, she was more aggressive. The third, just an hour or so ago, she was riding on top. Lucky's thighs still tingled with vicarious satisfaction.

And yet. Lucky could tell that Luke was morose, as he drifted off to sleep. At least he was as morose as his carefree nature ever permitted. Something was missing from his life, and he knew it. For all his artistry in the sack, a part of him remained inexplicably detached.

Lucky considered. Luke too would turn twenty-one on the solstice, of course. In his culture, he had reached his majority at eighteen, so the birthday was less meaningful than for Lucky. But still there were transitions ahead for him. Luke's apprenticeship was ending. He must soon choose between life as a wood worker, full partnership with his guardian and mentor Karis, or—something else. He must soon choose between marriage with Karis's daughter Karive, so comfortably warm and pragmatic, or—something else.

Luke was restless, Lucky knew. Happy as he was with his pastoral pleasures, Luke envied the richer world that Lucky inhabited. He wanted to browse a college library, surf the internet, drive a car, fly in a plane. But those things were just the stuff *his* dreams were made on, as Mirve and her sisterhood seemed to be perpetually confined to Lucky's dreams.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

More specifically, the Dream.

Lucky couldn't do much for Luke's yen to travel. At least not yet, not until they rediscovered that gateway between their separate worlds. *If it exists. If Luke and his world exist. If he's anything more than a neurotic fantasy nursed by a wimpy orphan.* Then, *No, don't go there yet again. He has to be real.*

What could Lucky do to help this time? For all their surface differences, the two were very much alike. So Lucky fell back on a well worn formula. *What would I want for myself if I were in Luke's shoes?*

The answer bubbled up from his subconscious, so strong and sure it surprised him. Elwen. She and Luke had grown up together, lying on banks cheek by cheek studying tadpoles, surreptitiously practicing the newest dance steps, making fantastical plans for their separate futures. Her family had moved to a farm up-valley several years ago, though, and Luke saw her only rarely now. She teased him about his rakish ways, but gently. He joked about her bucolic isolation, with equal kindness.

Luke's relationship with Elwen went deeper than any other, Lucky knew. Much deeper than with Karive, with whom Luke was all but engaged, at least in the minds of many in the village. Perhaps it was fortunate that the two had been separated, before they bruised each other with the romantic bumblings of adolescence. Elwen was a self-assured young woman now, with a growing reputation as a Healer, the kind of companion that Luke deserved. And needed. Perhaps she was the missing ingredient that left Luke so distracted and restless.

Lucky tried not to dwell on his own lifelong infatuation with the girl in question. She was, after all, just a dream girl. Literally.

Don't think about it.

He looked at the clock radio again. 6:55. He needed a shower, breakfast, twenty minutes to finish his advanced calculus assignment. Mandatory chapel at eight, and he had only two cuts left for the semester. He sighed. Not enough time.

He threw off the covers to get up, even as the steam pipes began their clanking promise of imminent warmth. He lay there unmoving, frozen between duty and desire.

Damn.

Okay, he could forego the shower and breakfast. Math wasn't until eleven. He could finish the homework after his nine o'clock. But making chapel would be tight. If he didn't recover in time, he'd catch hell from Greaves again. And the chancellor really seemed to have it in for him this term, for some unfathomable reason. He set the alarm for 7:55, turned the radio up loud. Who knows, maybe it would wake him in time.

Then Lucky went into the Weaving. It was an easy Weaving, about the easiest imaginable. Still, the recovery would cost him about an hour of unconsciousness—God's price for the privilege of tinkering with probabilities, even in a neighboring universe, even in the smallest of ways. It involved no real expenditure of energy. A stitch here, a gather there, and the deed was done. Plenty of wiggle room to pull it off without doing violence to Heisenberg's Uncertainty Principle.

If you could fault the Weaving at all, it would be on the basis of aesthetics. It was the stuff of bad plots, a deus ex machina, *however tiny. The kind of thing a desperate writer tosses out when deadlines loom. Why should this particular girl awaken one morning to thoughts of this particular boy? A chance glance at a broken comb. Time to buy a replacement. Nothing much to do around the place for the next few days anyway. Her parents would be happy to give her a break from chores. Nobody ill or dying to attend to. Reason enough to make an unplanned trip, to drop in on a childhood friend. Still, it was a lame excuse to get two*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

people together and advance the action.

But Lucky went into the Weaving. He cared not one whit for the aesthetics of his intervention, not when the plot of his own life was so dreary. So Lucky went into the Weaving, the Weaving of coincidences.

Luke didn't want to wake up, but he did. As was so often the case, the Dream of the night before left him disturbed but curiously intrigued. Beside him lay Mirve, finally satiated in her passage to womanhood, now enjoying the ultimate luxury of sleeping past dawn. Luke spooned behind her, giddy in the aroma of her flaxen hair.

She was a sweet one, but with an edge that Luke found refreshing among the local girls. He studiously avoided counting his conquests or ranking them, though Lucky often performed both tasks for him, unbidden. And yet, Mirve had a unique way about her that was at once challenging and reassuring. Maybe this was the one he should cultivate as his future wife.

He frowned. Lucky was right. Try as he might to convince himself otherwise, Luke felt his own detachment. He would be doing no woman a kindness in bringing only part of himself to a marriage. Something was missing. Probably it had always been missing, Luke reflected, but now it seemed to matter.

Mirve stirred, smiled in his arms. He nibbled an ear, she wiggled free with a throaty laugh. Her eyes met his, lowered. Now began the delicate time. Luke knew what to do.

He reared up in bed, careful not to disturb the blanket she held beneath her chin, or to expose his own nakedness. He pulled an ornamented robe from a convenient peg, handed it to her, smiled, and rolled to face the wall. It always amazed him how a woman could go from the deepest intimacy to girlish modesty with the coming of daylight, but he accepted it. He heard her barely audible thanks as she rose and wrapped herself from neck to ankle.

Well, the room *was* cold. Time to stoke up the stove. He pulled on the remaining robe, rather less ornamented, and set to work. Mirve had already disappeared into the next room.

Luke's quarters were famous among the girls in the village for other things besides Luke himself. Indoor plumbing was one of them, and his hot-water shower another. This early in the morning the water would be just tolerably warm, after a night of banked fires. But in a land of privies, chamber pots, and wash basins, Luke lived in the relative height of luxury.

Luke had similarly outfitted two of the guest rooms in the nearby inn, to the utmost pride of his fellow villagers. Perversely, however, few travelers actually paid the premium for such services. Too effete, most would mutter, and subversive of self discipline. Even more perversely, nobody else in the village had as yet followed Luke's lead. They could look on in admiration, but secretly sided with the Puritanical travelers.

Luke's overnight guests had no such reservations, and Mirve was no exception. He could hear her splashing in the warm drizzle, humming contentedly to herself as he set out breakfast. As always, he was careful not to speculate about the relative appeal of his bed, with him in it, or his bath.

Milk, fruit, bread, honey, a cold but sturdy porridge lumpy with raisins. No low-fat yogurt here. His was a society based on hard work, where even the daughter of a prosperous tanner burned 3,500 calories a day. Luke knew the proper breakfast to cap a night of active lovemaking.

Mirve seemed to agree. She emerged from the bathroom in a moist cloud, rewrapped in the robe and combing her hair with one hand. Her oaken rat-tail comb was another of his "inventions," plucked from the Dream along with the flush valve and the septic field. And

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rather more successful, judging from its steady sales over the past five years. Karis was most pleased. Mirve kissed him on the cheek, adding a brief flash of bare breast in the bargain, and joined him at the table.

He eyed her as they ate contentedly. Lucky liked her too, so his predawn Dream told him. That was a good sign. For all his personal shyness and inexperience around women, Lucky was a good judge of character.

Luke was plagued by none of the self doubts that haunted Lucky. He *knew* that Lucky and his strange alternate world were real, just as he *knew* that his mother had been born in that world. Luke was confident in his own abilities, but much too sensible to claim credit, even subconscious, for the marvels he had learned from his mother, or culled from his Dream.

Not just a comb and a flush toilet. Those journals over his desk held everything his mother could remember about low-tech medical practice and English vocabulary, both unknown in his world but commonplace in Lucky's. They captured Luke's re-creations of Euclidean geometry, Newtonian mechanics, and probability theory, all learned from Dreams of Lucky doing homework, of all things. Lucky had even stayed up nights for a week endlessly repeating the derivations of special and general relativity, so that Luke could eventually capture the essential details on succeeding mornings. Luke even understood some of it. Mostly.

In a world without practical electricity, Luke knew himself to be no Einstein.

And yet, he still had his own set of doubts.

Luke cleared his throat nervously. Mirve saw his expression, put down her porridge spoon. Luke was not noted in the village for his introspection, to put it mildly. This was something new.

"Uh, I was wondering." He toyed with his own spoon. "Do you think I'd make someone a good husband?"

Astonishment flared like heat lightning, followed by a quick patter of other emotions that Luke could not decipher. Her eyes danced across his face, searching out those subtle cues that most women, and few men, learn to read well. A long pause.

"I need to know where you're going with this." Guardedly, but not unkindly.

"It's just that, well, it's no secret that I've, uh, been with a lot of girls." No reaction. "But, uh, I'm not going to be young forever." Silence. She wasn't helping. "And I think it's time I started planning for whatever comes next."

Understanding dawned, or so she thought. She smiled her sexy sweet smile and took his hand.

"Oh, I wouldn't worry just yet. There are still plenty of girls hereabouts eager to spend a night or two with Luke the Carpenter." A conspiratorial grin. "I can give you a nice list to start with if you're running short of hints." Coy pause. "I might even put my own name down for another night, if you don't mind."

The sexy sweet smile faltered the least bit. Having dared to offer, however obliquely, Mirve was now vulnerable to rejection.

But Luke was oblivious to the risk she had taken. All he heard was what he feared the most. Her attempt at reassurance had entirely the opposite effect. His face fell.

Mirve bit her lip. Instinctively, she pushed away from the table, came to him, and snuggled into his lap. She held his head in her arms, stroked his cheek.

"I guess I didn't put that very well," she said at length. "Can we back up and try it again?" She cocked his head up to look into his eyes, smiled and kissed him lightly on the lips.

Luke sighed. "No, you're right. I'm a great guy for a fling, but not for the long haul."

Another pause. Neutrally she said, "You know, Karive will marry you." Pause. "And she'll make you a good wife."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Another sigh. "Yes, I know that. The whole damn village knows that." He bit his lip. "And I'm not ungrateful. I care for her a lot. It's just that . . ."

Mirve cut in, singsong. "It's just that I wish there were something more, but I don't know quite what it is. Maybe there's not enough passion. Maybe we'll get tired of each other after a few years and a few kids. Maybe there's someone else who'd be better for me." Sidelong glance. "Like that, what's her name? Tanner's daughter. Oh yes, Mirve. Bet it'd be nice to try her in bed. And then there's . . ."

Crooked smile. "How'm I doing?"

"Pretty close to the mark." He grinned sheepishly. "I didn't know you read minds."

"I don't. But I do talk to most of the other girls, and we all go through this litany three, maybe four times a month. Too bad you guys never learn to talk out the really important stuff."

She tousled his hair. "You should be flattered that so many of us try you on for size, as it were. You know you're the envy of guys up-valley and down."

"Yes, I know. And I am flattered." Pause. "But that's still not exactly what's bothering me." Pause. "There are things that come with marriage that really matter."

"Like what? Kids, maybe? You guys are always worrying about passing on your bloodlines." She stroked his forehead, almost maternally. "Well, that's not a problem for you. You know you've got at least three kids already, don't you? Probably four."

Luke almost dropped her from his lap. "You can't be serious?"

Mirve studied him with renewed understanding. "I know your mother was foreign, *really* foreign, but you've lived here all your life. Surely you've heard what they always say at wedding celebrations—the bride chooses the first dance, the groom gets the rest."

"Well, yes, but I always took that literally. You don't mean. . . ?" She was grinning openly at his naivete. "But the husbands . . ."

"Are practical guys in these parts. We have many pregnant brides, but very few unwed mothers. It's pretty hard raising children on your own." She wiggled seductively in his lap, giggled and hugged him.

Luke was still stunned. "I really never knew. I guess I just assumed that you girls had some secret means of contraception, passed on from mother to daughter or something." He shook his head. "I, of all people, should probably know better, but I always assumed that if Karive and I married that all the children would be mine."

"In Karive's case, that's a pretty safe bet. But I wouldn't count on it in the general case."

She went silent. Stroked his forehead, somewhat less maternally. She cocked his head up again. Her eyes danced across his face. "I need to tell you two things, and you have to hear them both before you say anything."

It was his turn to be guarded. He nodded, slowly.

"Okay." Deep breath. "Thing one. Jano, the butcher's son, has twice asked me to marry him. Next time he asks, I intend to accept."

Luke swallowed. Nodded again. Said nothing.

"Thing two. I hope we made a baby last night. If we did, Jano and I will raise it as our own. Proudly." Long pause. Very softly, "And if we didn't, I'd really like to try again, before I marry Jano."

Luke no longer pretended any control over this conversation. "Uh, okay." Then, "Mind if I ask why?"

"Because you're the luckiest son of a bitch I've ever met. Some of that luck is bound to rub off on your child, and maybe the rest of the family."

A cloud of flaxen hair, still moist from the shower, enveloped his face. "Besides, I think I love you. Even if you'd make a lousy husband." She kissed him then, long and passionately.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

She got up, dropped the robe to the floor. He watched her, unable to move, as she gathered her clothes and dressed unashamedly, even proudly, before him. Somehow, he understood that theirs was now a relationship of peers. They could be lovers for a time, or just friends for years to come, with no need for pretense in either direction. It was not the relationship he had fantasized about for so long. It did not satisfy his sense of incompleteness. But it was a step in the right direction. A big step.

She kissed him on the cheek and left.

It was some time afterward that Luke finally recalled the last of the morning Dream. Lucky was taking chances again, in his usual zeal to take care of his soul mate. It would be nice to see Elwen again, sure, but Luke had his doubts. It didn't feel to him like Elwen would supply whatever was missing in his life. Not for the first time, he suspected Lucky of simple voyeurism. But he quickly banished the thought as disloyal.

To his credit, Luke was genuinely worried. He would gladly settle for a little less good luck, if only Lucky would take better care of his own fortunes.

Lucky was dashing for his nine o'clock. He tried to give a wide berth to the chapel, still emptying of the last few students and faculty, but he had no time to spare. He cut it too close. Two hulks loomed in his path, blocking his way. Sullivan and Mackenzie. Had they attended Hogwarts Academy, Lucky was certain they would have made Slytherin House. And been the best of friends with Crabbe and Goyle.

"Chancellor wants to see ya." Sullivan always did the talking. Mackenzie supplied the supplemental menacing grin. Lucky began a wide sweep around the two thugs. Mackenzie moved to intercept, extending a beefy arm.

"Now." Sullivan again, of course.

"Say, thanks for telling me, Sully," with mock sincerity. Sullivan scowled at the invented nickname. Lucky had no chance of making the bell now, and Professor Frazer was a stickler for punctuality. At least he had a viable excuse, however unwanted. Lucky gave an exaggerated smile and wave, then set off for the Admin building.

The offices were a small anthill, still settling down from the disturbance of chapel. Adult white males were drifting back to their private offices, coffee cups in hand. The ones who did the real work, mostly female and middle aged, were resuming their disrupted chores at various desks, copiers, and printers in the open work area.

Angie looked up from her typing as Lucky approached. She had guarded the chancellor's door for all the sixteen-plus years that Lucky had occasion to approach it. Plenty long enough for the two of them to have formed an elaborate, if guarded, relationship.

He pointed at the door. She nodded awareness of his mission, angled her head toward the small, uncomfortable waiting area. So Lucky would be cooling his heels for anywhere from fifteen minutes to an hour. The chancellor optimized his own time at the expense of everyone else's, save big donors and angry parents.

He knitted his brow to ask, "What's up?"

She shrugged a "Damfino." Couldn't help adding a worried look that said, "This is something out of the ordinary. Be careful." Like most staffers at Jude's College, she felt a shared obligation to look after the school's orphan in residence. But also like most, she knew better than to be too overt about it.

Their wordless conversation ended, Lucky settled onto the plastic Danish Modern sofa, a relic of the 1960s, and dug out his math homework. The coffee table was too low to serve as a work area, and too cluttered with old magazines. But Lucky was used to it. At least he had a chance to rescue one obligation this morning.

But that was not to be.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Hey, Lucky." He looked up to see an aggressively healthy young woman beaming down at him. Deanna Quayle, that was her name. Co-captain of the girls' soccer team, helped organize the Outing Club two years ago, bio major. He had often passed her while hiking around the Sleepers. She always had a friendly wave for him, would even make a bit of small talk before her ever-present friends radiated sufficient impatience to drive her onward.

"Ho, Deanna." With an expansive gesture he offered her the other half of the plastic sofa.

"You blow your chapel requirements too?" She sat about a foot closer to him than your basic guy would. She also wore a delicate, very un-guy-like perfume. Lucky felt his accursed awkwardness stir.

"Uh, no. I still have one cut left." A brief moment of panic. Had he miscounted? "At least I think so."

"Lucky you." She covered her mouth and giggled at the unintentional pun. Almost a Japanese school girl. "Looks like half the soccer team is in trouble. Gwen's van broke down on the way home from the finals Friday. We called ahead to the school, even got a note from the mechanic, but it's no go. Greaves really has a bug up his . . . uh, I mean he's really intent on enforcing the new chapel policy." She eyed him nervously.

"I'm sure he means well, as always," with an absolute minimum of sincerity. She got the message, relaxed visibly. "Looks like in his zeal to get us all to take chapel more seriously he's also going to make a little extra money for Jude's. I'm sure the trustees will be doubly pleased."

She wrinkled her nose. "Yeah. My mom's gonna kill me if I have to take the summer make-up. And Kristie has already planned a whole summer in Europe. She's freaking out." She leaned closer, conspiratorially. Lucky tried not to think about her perfume. "I don't think some of the senior girls can afford the extra tuition. They may have to leave without a degree. Isn't that awful?"

Lucky nodded assent, grateful that he could reply nonverbally. He vaguely recalled the various protests when Greaves announced his harsh new rules last September. Girls' soccer was particularly hard hit, since they had so many away games on Friday afternoons. Most of their chapel cuts were spoken for right from the start of the semester.

Deanna leaned closer again. "Look, maybe you could put in a word with Greaves. After all, he's practically your father."

"Guardian. He's my legal guardian, not my father." She recoiled at his gruffness.

"Sorry," he said hurriedly. Contrition drove away shyness. "Look, I've never had much success getting Greaves to do much *anything*. Sometimes he decides to do me a favor, for his own reasons, but many of those supposed favors backfire. I get resented for special treatment that I don't even want."

She studied him for a long moment, obviously reconsidering a host of preconceptions. Softly, "Oh, I'm really sorry." She put her hand on his knee. Only briefly, but long enough to rekindle his awkwardness.

A germ of an idea formed in the back of his mind. But he said nothing, not daring to speak once again.

The silence began to stretch out. Then, with a trace of forced joviality, "Say, did you know that I'm turning twenty-one just after Christmas? That means all us seniors on the team will be street legal for New Year's Eve. We're all coming back early to go bar hopping. Kristie's folks say we can crash at their place for the weekend."

"Sounds great," matching her tone. "As luck would have it, I'm turning twenty-one in just a couple of days myself." He worked hard to keep the dryness out of his voice.

"Really? How cool is that?" Lucky kept a straight face. Everyone on campus

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

knew the tale of Lucky Sites, born in a snow storm and brought to town on Christmas Eve by his sole surviving parent. But he knew she was trying to smooth over her gaffe. He let it pass.

"Say, would you like to join us?" She giggled again. "Maybe not for the pajama party, but we could hit the bars with the girls." Pause. "Maybe even grab a bite to eat before the gaggle shows up."

Lucky experienced a rapid triplet of mini epiphanies. This girl, this very nice and reasonably attractive girl, was asking *him* for a date. Not only that, but the slight uncertainty in her voice told him that she didn't take his acceptance for granted. Then he noticed the sudden hush around them, as half a dozen women paused in their typing and paper pushing to hear his answer.

These people actually care about me. The realization awakened a confidence in him that had long lain dormant.

He was formulating a suitably casual reply when the chancellor's office door opened a crack. Greaves met Lucky's eye, waved him in curtly, and walked back to his desk. One did not keep the chancellor waiting.

"Uh, hold that thought." He managed an encouraging smile as he scraped his math books back into his bag. As he pulled the door closed behind him, he heard one of the office workers, a particularly prim lady nearing retirement, mutter a very rude monosyllable. It made him feel even better.

Greaves was behind his desk already, apparently studying a piece of paper on his blotter before him. Lucky didn't bother to try to read what it said. He knew it to be a decoy. After a lifetime of doing battle with the chancellor, he was wise to most of his ways. The sideboard was where Greaves always stacked up his ammunition. Today, there were several sheets of paper laid out lapstrake. He could see just enough of each to know that this was indeed going to be a bad day. Angie was right to be worried.

"Hello, Lucky. How are you feeling?"

"Uh, okay I guess." That was a new tack. Greaves was not one for small talk, and he *never* invited you to select the topic of conversation. When you were with Greaves, you talked about what he wanted to talk about. Period.

"You weren't at chapel this morning."

"I overslept."

"That seems to be happening more often these days."

"Really? I don't think so. But I have been working pretty hard this term. You know I've comped all my finals with papers, so I can visit graduate schools in January."

"Um, yes, well." Danger sign. Greaves always said "well" when he was going to oppose you. *Where was the attack going to come from?*

"You know we take chapel attendance very seriously here at Jude's."

"Yes sir. I think we're all keenly aware of your new policy."

Greaves frowned. "The *policy* is just there to help convey the *spirit.* We are only a true community if we truly share common values." Greaves always drifted into redundancy when he pontificated.

"Yes sir." It was the only safe answer.

He picked up the top sheet of paper from the sideboard. *Stand by to fire one.*

"When I noticed your absence at chapel this morning, I sent Macalister to check on you."

That toady? What the hell for? Aloud, "Uh, that was very thoughtful of you sir, but it was hardly necessary. I just overslept, like I said."

"Macalister says here that your radio was on very loud. He could hear it through the door." He paused, as if reading ahead a sentence or two. "He says he knocked quite loudly but was unable to wake you." Greaves lowered the paper and stared at Lucky over the top of his reading glasses. *He's building a paper trail, but for what?*

"I guess I was pretty tired." He essayed a small smile, decided a return salvo was called for. "You're always telling

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

us not to skimp on sleep, so when I had trouble waking up in time I decided it was better to get the extra rest this morning." Then, "I believe your policy does allow for a certain number of chapel cuts, and I still have at least one left. At least if I've been counting correctly."

Greaves placed the paper neatly in the upper right corner of his blotter, fussily squared it up with the edge. Then he picked up the second sheet from the sideboard. *Stand by to fire two.*

"Um, yes, well. You do seem to have one left." He pretended to study the attendance record for a prolonged moment. "Though we do take a dim view of students who just manage to, ah, get by." He stretched out the last two words to carry an extra freight of disdain.

"I've heard you express that sentiment quite often with regard to academics, sir, and I agree with it. My grades show that I always do more than just . . . get by." It was hard not to mock his phrasing. He couldn't resist at least a pause before those two words.

"But the chapel requirements seem more clear cut," he continued, "at least to us students. You want us present at a minimum number of Friday evening and Monday morning chapels. We understand that. Everybody I know has had occasion to miss a few chapels this term. Only a few have exceeded the maximum permissible cuts so far, doubtless because of the stiff penalty you've imposed." Pause. "Perhaps you should have allowed fewer cuts if you think so many of us are just . . . getting by."

Greaves scowled. Lucky knew that the chancellor's new policy was widely unpopular, even among the trustees. There was no way he could make it any more oppressive. It remained to be seen whether parents would sit still for the penalties at the current level, particularly now that several otherwise compliant kids had unwittingly crossed the line.

But Greaves rallied faster than Lucky had expected. "So you have one cut left, but you've informed me that you plan to miss two chapels in January. How do you propose to deal with, ah, that?" Again the stony stare over reading glasses.

"Excuse me, sir, but I thought we worked that out earlier. Jude's has always allowed seniors time off for graduate school interviews, so long as it doesn't interfere with exams. You've known about my trip to Ithaca for two months." Greaves said nothing. *He's going to renege. But why?*

Lucky tried another tack. "According to the new policy, we must attend at least half the *required* Friday and Monday chapels, and I intend to do that. How can I be held accountable for missing chapels that aren't required?"

Greaves placed the second paper neatly atop the first, fussing even longer over the alignment of papers and blotter. Not for the first time, Lucky suspected that the chancellor had a sadistic streak. He picked up the next sheet from the sideboard, studied it. *He's enjoying this.*

"Um, yes, well. That has always been our policy in the past." The slightest emphasis on the last word. "But I'm afraid that's not how the current policy is written." This time Greaves handed the paper across his desk to Lucky, so he could read for himself. It was, of course, a copy of the page in the current Student Guidebook on the chapel policy. *Fire three.*

"As you can see, the guidebook simply lists the required chapels and the minimum number to attend. It fails to state any reasons for individual exemptions." The chancellor shifted to his Stern Disciplinarian persona. "You really should have planned more carefully, Lucky. Or you should have allowed rather more margin for, ah, error."

He's definitely enjoying this. Lucky skimmed the rules quickly, looking for an out. The earlier germ of an idea took root, sprouted. Lucky reread the rules carefully, reaffirming his recollection

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and his logic. He listened with only half an ear as Greaves trundled on.

"I've made exceptions for you in the past, Lucky, as you well know." Greaves liked to repeat his name a lot whenever he was visiting bad luck upon him. "As your guardian, I'm sometimes torn between doing what's best for you and what's best for the school." Greaves paused, inviting Lucky to make some acknowledgment. He apparently decided to take Lucky's pensive look for some form of appreciation.

He continued inexorably toward the obvious conclusion. "In this case, however, I believe the best interests of you and the school coincide if I stand firm. If we're to make the new chapel policy at all credible, I can't begin by excusing my own, ah, charge." No response. "In the end, rules are, after all, rules," he ended lamely.

"Yes sir," simply. Lucky had his out, but he wasn't going to reveal it yet. He wanted Greaves to play the rest of his hand. Maybe then he'd know where the chancellor was heading with all this. Better to look cornered, for now.

Greaves glanced at the sideboard, hesitated. He stared at the paper in Lucky's hand, almost longingly. It was clear that he wanted to indulge his stacking ritual before advancing to the next round. Lucky did a quick internal audit for any sadistic tendencies on his own part, found none. It was simply good defensive tactics to keep Greaves off balance. He held onto the chapel rules.

Greaves shrugged perceptibly and picked up the next sheet of paper. *Stand by to fire four.*

"If you choose not to pursue this, ah, ill-considered Ithaca trip, all is not lost." Again the pretense at reading. "Professor Frazer has kindly worked out a program of post-graduate study here at Jude's that he thinks you'll find challenging." He looked up. Lucky waited him out. "As I've told you before, we're sure we can get you credit toward a Masters Degree within the state university system. And, I might add, it will cost you rather less than attending some Ivy League school. That has to be a consideration in your case, you know."

Greaves started to hand Lucky the course of study. Then he saw the paper that Lucky was still hoarding and reconsidered. Lucky was amused but not offended. He had no interest at all in what Frazer had worked out on his behalf.

"Actually, sir, I *don't* know that. You keep suggesting to me that most of my father's trust fund is exhausted, but I still don't know the details. Certainly not well enough to do any financial planning." Greaves harrumphed, a preliminary to taking over the conversation. Lucky hurriedly pressed on, in a marginally safer direction.

"But as *I've* told *you* on several occasions, I think it's time for me to leave Jude's. I've gone through preschool, lower school, upper school, and college. I've lived here since kindergarten. I've eaten more of the school's tuna noodle casserole than I want to think about. More to the point, I've taken every math and physics course the college offers. With all due respect to Professor Frazer, I need to expand my horizons."

Then, quickly, "As for money, I've worked on the assumption that I'll have to pay my own way through graduate school. Cornell has assured me that I'll qualify for a teaching assistantship and graduate student housing, if I pass my interviews that is. Whatever the state of my finances, I think I can cope."

Greaves sat and scowled for a long moment. Eventually, he recovered Lucky's chapel attendance record from the corner of his blotter and dropped the course of study in its place. He didn't bother to square up the new pile. *Wow, is he really that off balance?* Greaves couldn't possibly have believed he could scare Lucky into giving up on Cornell. *Or could he?*

"So you're informing me that you don't intend to fulfill your chapel attendance requirement this semester? And

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

you're ready to deal with the consequences to your collegiate career?"

"Actually, sir, I didn't say that. And I don't mean to imply it. The issue of chapel attendance is separable from my leaving Jude's when I graduate this June." Just the slightest extra emphasis on those last seven words. The merest hint of defiance.

A deeper scowl for an even longer moment. Almost reluctantly, Greaves picked up the last sheet of paper from the sideboard. *Here it comes. Stand by, boarding parties.*

"Ah, yes, that reminds me." The voice was artificially light. "You'll need to get your tuition paid in time if you hope to attend classes next term." This time he passed on the sheet of paper with barely a glance. "Let's get this out of the way and we can consider some, ah, creative solutions to the bind you've gotten yourself into."

It was the expected letter, addressed to the attorneys for the college, as usual. Only this time it was briefer than ever, and disarmingly vague. All it needed was Lucky's signature. A fountain pen had been waiting all this time on a convenient corner of the chancellor's desk.

Lucky contemplated the chancellor, who was still feigning nonchalance. For all his apparent insensitivity to the feelings of others, Greaves had a keen nose for insecurity. And he always exacted a tribute to ease that insecurity. Always. But it had never occurred to Lucky that Greaves intentionally knocked people off balance to get those tributes. Until now.

But why does he want me to stay? My tuition and fees can't be that important to the school, not even with creative padding. There was still a mystery here.

"I understood that tuition wasn't due until late January." Lucky could feign lightness at least as well as Greaves. *Are you sure you're not being sadistic?* He decided not to pursue that thought.

"Um, yes, but." You could practically hear the gears turn. "But you know how slow these lawyers can be. We can't be pinching the school for payment just because of your special status, now can we?" *Nice volley,* Lucky admitted grudgingly.

Lucky read the two brief sentences several times, considering. They gave Greaves open-ended power to draw upon Lucky's assets. Not even a dollar or time limit this time, or a stated purpose for withdrawals, despite Lucky's persistent complaints about earlier letters. *And no space for a date after my signature.* If someone were to add a date later, after his birthday for instance, it could be construed that the fully competent adult Lucky had given carte blanche to his trusted guardian.

They say that some kids just never want to grow up. Hah. Then, *I know he's a son of a bitch, but is he really that dishonest?* And then, *There can't be all that much money at stake, not after all these years.*

Lucky knew he could quibble, as he had so many times before. Why should he have to sign letters at all, if Greaves were his duly authorized guardian? Not really necessary, but it made the lawyers happy to know that Lucky approved of his treatment. Why the vague wording, and no statement of accounts? It'll just make more work for the lawyers, more delays, and more expense to his dwindling reserves. He should be grateful that the school had taken on the burden of eking out his meager fund to provide him a home and an education. Sign here, kid.

Perhaps it was the added confidence he got from Deanna and the women outside. Perhaps it was his approaching birthday, as much symbolic as it was legally important. But Lucky was in no mood to quibble this time. Greaves had made his move too soon. And with insufficient ammunition.

"Sorry, sir, but I can't sign this right now." He pointedly folded up the letter and stuck it in his shirt pocket.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Greaves was staring at his folded hands, which flexed almost imperceptibly. "Um, well. You know that's going to cause a lot of difficulty for some very busy people here."

"Yes, that could be. But I think it's well past time that I take some responsibility for my future. I think I'll call this . . ." He unfolded the letter and read the name of the law firm. "This Bartleby and Soames and make an appointment to review my trust fund. I'll let the office know when that is, in case you want to attend."

Greaves was definitely off balance now. He had evidently grown so accustomed to manipulating a scared and lonely child that he failed to notice the young man forming before him. Lucky could see him scrabbling for a new hold.

Finally, Greaves picked up the chapel attendance record once again, reached for the pen that Lucky had ignored. "Well, until you inform me otherwise, I'll have to note your intention to violate the school's chapel policy with an unauthorized trip off campus." *Talk about stretching a point.*

Lucky smiled. "Then I guess I'd better inform you otherwise. I plan to make up for the extra January cut by attending the New Year's Eve chapel." He stood up, scooping his book bag off the floor.

"What are you talking about? The school is closed over the holidays."

Lucky scaled the chapel rules onto his desk, with a nonchalance just shy of rudeness.

"That may be, sir, but it's not what the guidebook says. See here where it states, 'Chapel is mandatory for all Monday mornings in December except the Monday after Christmas, and for all Friday evenings in December except Christmas Eve.' Doesn't say anything special about New Year's Eve, so I guess it counts as mandatory."

Greaves was almost whining. "But that's obviously a typo, an oversight. Nobody expects to attend chapel over the holidays."

"I do. And so do a few of my friends. In fact, I expect to be bringing a date." He was almost jaunty. "I don't think it's wise to amend the schedule at this late date, sir. In the end, rules are, after all, rules." Then, for the first time in his life, he left without waiting to be dismissed.

Deanna looked up from a dog-eared *Cosmopolitan* as Lucky came out the door. Boredom gave way to wonder when she saw his easy smile.

"So, as we were saying. How about dinner at Sadie's on New Year's Eve? Say, six o'clock? Then we can go to *chapel,*" with heavy emphasis, "and build up some spiritual credit before we hit the bars." Even louder, to reach the straining ears of the women across the room. "You might want to tell your teammates about the *New Year's Eve chapel,* too. I'm sure they'd rather attend that than spend next summer at Jude's."

He took Deanna's stunned look as assent, winked at Angie, and left.

Elwen was nattering on about a broken comb and a lack of chores. Luke tried hard to appear interested, but his mind kept drifting. He knew much of what she was going to say before she said it, a familiar experience after Lucky's repeated interventions. He was trying not to feel guilty, or to dwell on the fine line between manipulating chance and free will. On top of it all, he sensed the gulf that had grown between him and Elwen. She was not one given to nattering, so she too was trying to find a bridge to their old intimacy. Then there was the distracting swirl of the other diners. Everyone in the inn had a nod or a wave for Elwen, though few invaded the quiet corner where she sat and ate with Luke.

". . . and so I dumped the porridge on her head and set fire to the house."

"Beg pardon?"

Wry grin. "So, I finally got your attention." Astonishing gray-green eyes, a dusting of freckles, hair an ageless blonde tinged with platinum. The old sparkle was still in those eyes, but tem-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pered now with premature sadness and wisdom. The eyes of a Healer. In a flash, Luke saw Elwen as child, woman, crone, serenely beautiful at all ages. His heart skipped a beat.

"I was trying to tell you about Kandra's baby. While you were busy turning table legs this afternoon, I made a couple of impromptu house calls." Another wry grin. "You probably don't know it, but both of the Healers in the village are currently unavailable. One's sick in bed, the other's down-valley visiting family. Good thing I came along."

Luke admitted his ignorance with a shrug and a smile.

"At any rate, it's her first and she's pretty nervous about it, with good reason." He raised an inquiring eyebrow. "The women in her family are small in the hips, with a tendency to breach. Sure enough, I had to turn the baby. Kandra is sore now and probably still cursing my name, but she should deliver fine."

"So you need to be with her tonight?" Luke couldn't keep the hint of disappointment from his voice.

"No, but I did promise to look in on her after dinner. She won't deliver until sometime tomorrow, at the earliest. Babies come when they're damn good and ready." Elwen interrupted her narrative long enough to sop up the last of her stew with a chunk of bread. Her hands bore the calluses of farm work, but somehow retained a delicate touch.

"I wish I had your confidence in my own profession."

"You turn wood into things beautiful and practical. Everybody says so." A flicker of sadness. "But you misread me. We Healers are not so much confident as resigned. We do what we can, then hope for the best. So much still depends on fortune."

Luke felt another brief twinge of guilt. That in turn set his mind adrift once again. He fought for control. Now was the time to be with Elwen, not indulging his own introspections.

But Elwen rescued him, as she had done so often in the past. She pushed away her bowl, wiped her hands. "So much for dinner. Now you can tell me why you've been too preoccupied to hit on me for the past two hours. You're losing your touch." She grinned impishly.

Luke knew how to flirt at least as well as he made furniture. Reflexively, he smiled and conjured up the stock riposte. Caught himself. Not with this woman, not tonight.

Soberly, "Truth is, I don't know whether I'm more afraid you'll say no or that you'll say yes."

Arched eyebrows. "Mmm. I think I'll take that as a compliment." There was more than flirtation in that tone. "And if I say no, what are you afraid of?"

He made himself look into those gray-green eyes, despite the risk of drowning. "I've known you all my life, sometimes as friend, sometimes as sister." He considered. "Yes, even sometimes as mother substitute and sometimes as Healer. But now when I look at you and talk to you, all I want to do is be with you. All the time."

He grinned sheepishly. "I know that sounds dopey, probably adolescent as well, but it's the simple truth. I just really want to be with you tonight."

The innkeeper showed up at that moment, collected their empty bowls and refilled their cider cups. Luke had already drunk enough to loosen his tongue. The buzz was nice, but he didn't want to make a fool of himself. Not with this woman, not tonight.

"Another good line," she ruled. "Maybe you're not losing your touch." She leaned back, cocked her head. "And if I say yes?"

"I don't want to risk losing you as friend, sister, mother, and/or Healer."

She reached across the table to take his hand. "Small chance of that, o friend, brother, child, and/or patient mine." She massaged his knuckle with an idle forefinger. "Still, I don't know. There are dangers."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Dangers?"

"For me, if not for you."

"Sorry. I never thought of myself as particularly dangerous." Then he remembered his conversation with Mirve that morning. "You don't mean . . ."

She guessed his thought, waved dismissal. "No, I'm not worried about getting pregnant, if that's what you're thinking. Not until I'm good and ready. I'm a Healer, if you recall. And I have a well worn copy of your mother's Guide to Healing." Then, opaquely, "There are burdens heavier than an unwanted child, you know."

He entwined a finger or two with hers. "I'm beginning to find that out."

"So," briskly, withdrawing her hand. "You're finally ready to talk about what's bugging you? I must say you gave our good Mirve a real fright this morning."

"You talked with Mirve?" A hint of alarm.

She laughed easily. "I talk with a lot of people. Including the girls who shack up with my oldest and best friend. But don't worry. We probably didn't discuss any of the things that you fear." Pause. "Just the really important stuff."

Luke remained silent, knocked off balance yet again that day.

"Well, that didn't loosen your tongue, I'm afraid." Businesslike, "How shall we proceed? Do you need a friend to talk to? A sister? Mother? Healer? All of the above?"

"Yeah, maybe that. I dunno. All I know is that I suddenly seem to have a thousand questions and no answers."

"Sorry, I don't do answers. But I can supply a different perspective, and maybe some useful information. Maybe then you can come up with the answers that work for you."

"Okay." Long pause. "There are some things I need to do soon. I know they're the right things to do, but I can't bring myself to do them."

"Then maybe they're not right—for you at least. Example, please."

"My apprenticeship ends soon, and Karis wants me to become his partner in the business."

"That's easy. You love working in wood, and Karis is a good man, but you're not ready to settle down. You've got a wanderlust that will eat you alive unless you indulge it. Why don't you ask Karis for some time off before you become a partner?"

"Do you think he'd agree?"

"Would you be happy if he did?"

Luke felt a burden lift, one he wasn't even aware of before. "Yes, that feels right. Thanks."

"No problem. My fee so far is one foot rub." He arched an eyebrow. "I spend a *lot* of time on my feet, doing what I do. Shall we continue?" He nodded.

"This one's tougher. Everybody expects me to marry Karive. And I really should."

"But you don't love her." Flat statement.

Defensively, "That's not true. I care about her very much. And we're very well suited."

"She doesn't love you, either." Equally flat.

Startled. "Did Karive tell you that?"

"Not in so many words, but yes." Pause. "Look, every relationship works out a comfortable distance. With you and Karive, that distance is about arms' length. You could marry. You could have kids. You would be kind to each other and have a good life together. But you both crave more intimacy than you'll ever give each other. With other partners you'll fight more and you'll cry more, but you'll also laugh a lot more. And feel more passion."

She folded her arms across her chest. "So, which do you value more, comfort or passion?"

Silence. Then, "Damn, you're good."

"Does that mean I've earned a back rub?" He nodded, smiling.

Luke contemplated in silence. Elwen waited patiently. The dining room had emptied out by now, but the innkeeper stoked the fire for his last two guests. He

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

owed both too many favors to begrudge a little extra firewood.

"Uh, this last one's pretty tough," Luke said at length, "partly because it involves you." She nodded, waited.

"I really feel that it's time for me to marry, but I also feel . . . incomplete."

He shrugged. "Sorry, but I can't put it any better than that. I'm not looking for a wife to fill in the blanks. Quite the contrary. But I'm also hoping that if I find the right person, maybe that feeling will go away. Or maybe I'll learn how to fill in the blanks myself." Pause. "Does any of that make sense?"

Elwen nodded. "Close enough." She knew what was coming next.

"Somebody, uh, that is, I thought, well, maybe the right person for me might be you." He looked at her then. Not pleadingly. He just looked at her.

Elwen took a deep breath. Then another.

"I think the kindest thing I can do for you is tell you all the reasons why I probably shouldn't marry you." His heart sank, but he kept looking at her. "Do you think you're up to it?"

At least she did say "probably." He nodded. "Go for it."

"First of all, you're too damn lucky." Luke was startled. That was the last thing he expected to hear. He started to protest, but she shushed him with a gesture. "You've never heard the expression, 'as lucky as Luke on a bad day'? No? Well, maybe people don't say it to your face, but it's pretty common. By the way, it means that you're still pretty damned lucky."

"Yes, but . . ." She held up a hand to silence him again.

"I know that many people treat you as a sort of talisman, but they don't see the effect your luck has had on you. Look, you were born in a snowstorm that killed your father, yet you lived. Your mother disappeared when you were five, but it didn't traumatize you. You've acted for all the world as if they'd both gone off on a hike and would be back any day now."

Luke stirred. She had hit awfully close to the truth. Or what he hoped was the truth.

"All your life you've gotten the breaks. You got the kindest foster father in town, and the best apprenticeship in the valley. Now you're getting the prettiest girls in your bed. And never a clinging vine or an angry boyfriend to deal with the morning after. Sheesh."

Luke didn't know what to say.

"If you feel incomplete, Luke, it's because you *are* incomplete. You're missing all those scars and disappointments the rest of us accumulate day by day. And it's not good for you."

She shook her head. "I don't know why you're so lucky, Luke. Maybe you've got some infatuated little wood sprite following you around, sprinkling pixie dust on your feet." Luke stirred again. If only she knew. "But I don't envy you, even if many others do. To me, it just makes you a bit dangerous to be around. Dangerous because you've never learned to be as careful as the rest of us."

This was starting to hurt, but Luke was determined to stick it out.

"But the saddest thing of all, Luke, is that you've learned never to gamble. You, who could probably make a fortune as a gamer in the city, won't take a risk that you can possibly avoid. Your accursed luck will always bail you out if your safe path proves too boring, so why risk a toss with unloaded dice?"

Elwen caught herself then, took another deep breath. "Sorry, I was getting a little carried away on that topic. Been wanting to say some of those things for too many years."

"'Sallright. It needed saying."

They sat in silence for a bit. The fire was dying down.

"Next topic. You're too secretive. It's like you have a whole 'nother life off to one side that you don't share with anybody else. And you've been that way as long as I can remember."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Luke was amazed. In all his life he had told only one person about the Dream, and that had cost him his mother. She believed him, and so did Lucky's father. They went off to find each other through the gateway where they had separated. And never came back. Lucky and Luke clung to the notion that their parents had ended up together in some pleasant third universe, and that one day the four of them would all be reunited. But neither of them ever told another soul. And both fancied that they kept their Dream well hidden from the suspicions of others. *But not from the likes of Elwen.*

"Please understand," she continued, "when you're there, you're *really* there." She smiled wistfully. "You have a way of making a girl feel like she's the most important thing in the Universe. At least for a spell." Sadly. "And then you go off to that other place again."

Long pause. "I may not envy your luck, but I admit to being jealous of whatever it is that keeps taking you away. I wouldn't want to be married to you and have to compete with that." Another pause. "In fact, I wouldn't wish that fate on any woman you might marry."

Luke nodded simple acceptance. Her eyes danced across his face. But he wasn't ready to share that secret yet. Not even with this woman, not even tonight. Elwen sighed.

"I've only got one other item on my list, Luke, but it's a big one for me." She hesitated, looked down at her hands. "I've lost count of the number of times I've fallen in love with you. But you never seemed to notice."

And he thought that nothing else could startle him that day.

She was smiling at him now, but there were tears in her eyes. "I can remember being ten years old and crying myself to sleep. I wanted to be your girl so bad." Sniffle. "But all you wanted was a buddy. So I was the best buddy I could possibly be."

Another sniffle. He handed her a napkin. "Do you remember when we were twelve and we practiced kissing like the big kids?" A smile and a nod from Luke. "It took me two days to wangle you into that little experiment. I thought it was heavenly. You just thought it was yucky to swap spit."

She blew her nose. Managed to look charming even as she did so.

"I'll save you the rest of the list. But it went on until we moved up to the farm. I thought I was going to die. My mother was, frankly, relieved. There's nothing like distance to keep infatuation under control. Or even deeper feelings."

She caught his glance, held it. Those gray-green eyes clouded over with puzzlement and awe. "Sometimes I can look at you, Luke, and see this wonderful little boy inside. He's sometimes shy, sometimes curious, sometimes playful. He wants so bad to be loved, and he's willing to be loving and loyal and sacrificing in return. I've been in love with that boy for most of my life."

The awe gave way to pain and sadness. The puzzlement remained. "But then he goes away. Then there's Luke the charming, or Luke the clever, or just plain Luke the lucky. Still fun to be around, still lovable. But more as a brother, or a buddy. Or maybe a short-term lover."

She drew a shuddering breath. "And that's why I probably shouldn't marry you, Luke. It would cost me too much fighting and crying for the laughter and passion I could expect in return. I wouldn't be good for you, or for the people who look to me as a Healer. So I may yet settle for some guy who may not hold me as closely as I want to be held."

A winsome smile, tempered with premature sadness and wisdom. "There are indeed burdens heavier than an unwanted child."

Luke finally knew what to do. He came around the table, gathered her up, and sat holding her in his arms. She was

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

crying deeply now, abandoned to grief, working toward that catharsis that small children seek intuitively, but adults too often lose the ability to reclaim. He crooned to her, stroked her cheek, rocked her gently. Her sobs turned into hiccups, then sighs, then the light even breathing of sleep.

And through it all, Luke felt a growing elation. Elwen was masterful. She read Luke like an open book. She saw every flaw he had been hiding from for years. *And she saw Lucky too. God knows how, but she did.* Yet for the life of him, he couldn't conjure up a shred of jealousy. At least now he knew where to begin healing himself.

Elwen stirred, opened her eyes. The room was lit only by embers.

"It's getting late. I need to go see Kandra." She sat up in his lap.

"Of course. Mind if I come along?"

She smiled sleepily, nestled beneath his chin. "Not at all. You may have to protect me, in case she decides to get even."

"You're pretty tired. Maybe I should just go get your bag from my room and bring it here to the inn. You might not get a room if we wait too long. Innkeepers have to sleep too, you know."

She sat up again, rubbed her eyes. "We can decide where I sleep after I take care of Kandra." She smiled at his astonishment. "I'm still working out the pros and cons."

"Whatever you decide is fine with me." Luke was shocked to realize that he meant what he said.

"I know. Thanks." She kissed him lightly under the chin. It was a good feeling.

"Oh, and I owe you another fee. Big time. As much as it hurt, it also really helped." Smile. "So, what'll it be?"

She climbed off his lap, tousled his hair. "We can decide what needs rubbing after I decide where to sleep tonight."

Lucky awoke to the gentlest of rapping. It stopped. Ten o'clock in the evening, said his clock radio. The white noise generator sprayed its soothing sound throughout the room. It had worked its customary magic in getting him to sleep a few hours earlier, well before his usual bedtime. He Dreamed almost the entire dinner meeting between Luke and Elwen. *Now* that *is going to take some digesting.*

The rapping repeated, barely more audible even when he was awake. He switched off the generator, reached for his robe. *Who the hell can that be?* More than a little annoyed, he yanked open the door.

Lucky had the best room on campus. It stood alone on the top floor of the dorm nearest the woods. The fire door at the bottom of the stairs effectively marked his private domain, giving him his own private bathroom and landing. Until Greaves gave it to Lucky as a freshman, it had been the prize reserved for the captain of the lacrosse team. The price Lucky paid for this luxury was to negotiate two floors of resentful jocks every time he entered or left his room.

Macalister was sitting on the top step, making notes in a small spiral-bound notebook balanced on his knee. He jerked around in surprise at the sound of the door, belatedly trying to hide the notebook.

"What the hell do you want?" Angrily. "If I may be so bold." With poisonous politeness.

"Uh, hi Lucky." He was still trying to hide the notebook, pointlessly.

Lucky stared at him. Let him fidget. "And?"

"I, uh, I was just checking to see if you were okay." Nervous smile.

"Why would I not be?" Lucky cocked his head. "And since when did you start giving a damn whether I live or die?"

The smile turned slightly nasty around the edges, before Macalister could bring it back under control. "Chancellor Greaves asked me to, uh, check on you from time to time." The nastiness re-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

turned, this time unchecked. "I think he's worried about you."

What the hell? That son of a bitch is still up to something, but what?

Aloud, "My compliments to the chancellor." Mock bow. "You can inform him that I'm in for the evening. I will be breakfasting in the neighborhood of, oh, eight o'clock, since I have no classes until eleven. If he—or you—would care to join me for breakfast, I would be most obliged." He turned to go back into his room.

"Sure, Lucky," with no pretense of politeness. As he started down the stairs, he tossed over his shoulder, "Good luuuuck." Pure taunt.

Lucky frowned as he closed the door. He didn't worry about anything Macalister might personally do. Everyone knew he was a coward, even the gang who tolerated his presence. But like most cowards, he showed his true feelings only when he thought he was safe from reprisals. Macalister knew something, or he wouldn't dare gloat. *Where was the attack going to come from?*

Lucky felt he had all the insurance against Greaves he needed. The call to Bartleby and Soames put him on record as a young man ready to begin managing his own affairs. He had an appointment set up for Monday morning, right after the Christmas weekend. It would be hard for Greaves to interfere with that process, now that it was under way.

The call was also an eye opener. To Luke's surprise, he was put straight through to Justin Soames himself. When Luke expressed his intent, he was equally surprised at the warm reception.

"Well, son," said Soames, "I'm glad to see you're finally ready to take on this responsibility. Simon may have had the best of intentions in letting you remain sheltered for as long as you like, but I don't mind saying that that has made life a little more difficult for us these last few years. As the chancellor must have told you, there are several major decisions pending regarding the school endowment, as well as your inheritance and the rest of your father's estate. I'm sure your father, bless his soul, will rest easier if his son takes a direct part in those dispositions."

Finally ready. Remain sheltered. Major decisions. School endowment. Inheritance. Father's estate. Dispositions. Luke desperately wanted to ask how much money was involved in all these decisions, but caution counseled otherwise. Whatever the amount, it was clearly rather more than Greaves had signified all these years. It was equally clear that Greaves wanted to keep that stewardship to himself, and well past his appointed term.

Greaves lived a notoriously simple existence. Almost ascetic. He probably wasn't diverting money to personal ends. Running Jude's was his life, and maintaining its success in an era of failing small colleges was a particular point of pride to him. Perhaps an obsession. It could be that he simply didn't trust Lucky's judgment as well as his own. Not if the survival of Jude's were at stake. If that was his driving motivation in jerking Lucky around all these years, Lucky could almost understand. Almost.

But the last words from Soames were a different matter entirely. "Okay Lucky, you have a Merry Christmas. I'll get your father's things out of the vault first thing Monday morning. Be prepared to catch up on a lot of reading." Chuckle. "How that man loved to write. Stay warm." And he hung up.

Chancellor Simon Greaves had a lot to answer for.

Lucky crossed the still darkened room to look out the window. The night was clear, though not terribly cold. He could see stars winking out one by one as they passed behind the Sleepers. The weather was supposed to hold this way at least until Christmas. Maybe his camping trip wouldn't be too uncomfortable this year, however fruitless it might turn out to be.

He stood there while the anger

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

drained out of him. There was no way he could process the rich tapestry of his latest Dream while resentment jangled his nerves. Ten minutes passed, a dozen more stars set, and he was calm.

Luke and Elwen would be finishing up at Kandra's sometime soon. Lucky had to decide what to do. He knew what he *wanted* to do, and that was get back to sleep in time to share Luke's first night with Elwen. What he *really* wanted to do, of course, was be with Elwen himself. *God, what a woman.* But he had long learned to accept Luke as his proxy.

There was a very good chance that Elwen would end up at the inn tonight, sleeping alone. She was still on the fence. If she gave in to her obvious desire for Luke, she faced a real risk of heartbreak. Luke knew that too, and would not take advantage of mere uncertainty on her part. But if she came to him eagerly and wholeheartedly, he would happily embrace her. Lucky couldn't predict how she would decide.

The urge to intervene was overwhelming. As early as this morning, Lucky would not have hesitated. But he took to heart what Elwen had said after dinner. With the best of intentions, Lucky had indeed been a pernicious influence on Luke all these years. A farmer might pray for rain, a parent might wish happiness for a child, a gambler might cross his fingers for luck—but none of these supplicants really want their boon in unremitting quantities. It eventually wears down the strongest of souls.

Two more stars winked out. Lucky made up his mind. Luke would suffer no serious harm from one more stroke of good fortune. Indeed, this last small gift from Lucky could mark a turning point in two lives he held dear. Lucky knew that what Elwen loved so deeply was really a part of Luke, a part that strongly resembled Lucky to be sure, but not Lucky himself. Luke just needed a reason to cultivate that part, and now he had one. Luke's happiness was Lucky's, and always would be.

He shucked his robe and climbed into bed. No need to set an alarm, he had plenty of time to recover. Tomorrow he would attend his one class for the day, grab his gear, and head up into the hills. He could deal with Greaves and his machinations later.

Then Lucky went into the Weaving. It was just a mildly difficult Weaving, if he judged his subject properly. The recovery would cost him maybe a couple hours of unconsciousness, and the deed would be done. He would not be coercive—his conscience would never permit that—but he would give the chemistry of sex every chance to prevail. The laws of probability might be stretched a bit, but hardly torn.

Who can plumb the depths of a woman's fancy? Say what you will about romance—women are far more hard headed than men about the practical need for long term companionship. Say what you will about genetic desirability—females of all species mate with males for their own inscrutable reasons. Say what you will about the randomness of decisions made on the spur of the moment—a needful inexorability underlies most bonding between woman and man. Though Lucky knew all these things, at some level his romantic soul balked at playing matchmaker with such a heavy hand.

But Lucky went into the Weaving. He dreaded the thought of a lost opportunity, if any small inclination could bring these two together for the night. So Lucky went into the Weaving, the Weaving of whims.

Luke sat at the window. Leaded glass windows framed mountains in the middle distance. Against the dark Western sky he could just make out the limestone outcroppings he knew so well, set weakly aglow by the first hint of dawn's early light.

The Dreamers, locals called them. An

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

uninteresting pair of bumps along an uninteresting stretch of the Eastern Mountains. And in between, a stubby irregular notch. Dreamers' Pass. An easy three-hour climb from the edge of the village, with nothing much to see on arrival, and nowhere to go for miles afterward but gullied scrubland on the far slope. A fitting birth place for Luke the Carpenter, professional woodworker and dreamer extraordinaire.

Luke's view was rather lower, and about a half mile further North, than Lucky's. It was on the river, of course, just below the falls so the sawmill could tap water for the wheel. In Lucky's world all this was tamed. Along the state highway, in fact, the river was hardly more than a culvert. Fortunately for Luke's romantic soul, he was unaware of this particular subjugation of nature.

"You're awake early." Elwen came up behind him and placed her hands on his shoulders. Luke's robe draped across her shoulders for warmth, but she left it open in front, unconcerned about her nudity. It was a mark of Luke's upset that he had donned the ornamented guest robe unthinkingly when he arose an hour earlier.

He covered her hand with his, squeezed it. Only then did she see his bleak stare.

"You look like you've just lost your best friend."

"Maybe I have." Obscurely.

"Well, if you think you've lost me as a friend, you needn't worry." She kissed the top of his head. "This is where I want to be. Here. With you. Right now."

"Thanks." Then, "Me too."

She sat down next to him on the bench, finally wrapping the robe around herself against the chill from the window. Took his hands into her lap. "So, are you ready to talk about this thing?"

"I think I have to be. I owe it to you and—someone else." He essayed a sad smile. "I just wish I could have talked to you more freely last night."

"We covered a lot of turf. You can't change a lifetime of behavior in just a few hours."

He looked out the window. "A lot of what I have to say is going to sound pretty bizarre. My fear is that you'll just think I'm crazy."

"Try me."

He kept looking out the window, as if captivated by the Dreamers. He spoke softly, almost abstractedly.

"What if I were to tell you that my parents were born in another world? A place remarkably like this, at least for mountains and rivers, but still wildly different. A place with many more people, with technology you can barely imagine. Roads six lanes wide and beautifully paved, for machines that can carry you from here to the city in just a few hours. A place with other machines that fly between cities, even across oceans, in just a few more hours. Machines that remember things, and talk to other machines to help you find information, even on the other side of the world." He turned to her, half pleading, half defiant.

She squeezed his hands earnestly. "Luke, I've read your mother's Guide to Healing. I remember her funny accent. I saw the clothing she kept from when she first brought you down to the village, her beautifully crafted jewelry, and the tiny clock she wore on her wrist." She was as pleading and defiant as he. "It's easier for me to believe that she came from such a world than the half-baked tales she told when she finally learned our language."

A half smile. "Well, that's a start. But I'm still not through stretching your credulity."

Looking at the Dreamers again. "My father was a kind of scholar. He studied the way stars move in the sky, and planets move around the Sun. And even though people knew an incredible amount about all those things, he believed he had learned something new. He figured out that another world like ours had to exist, and that there had to be times and places where you could

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pass between the two worlds. Those times would most likely be when the Earth and Sun were lined up in special ways, like on the longest day of the year, and the longest night."

"You mean when we celebrate the solstices, midsummer and midwinter. Tomorrow, for instance."

"Yes, exactly."

"But finding the right places would be hard. My mother figured out the best strategy for searching. In fact, she found two strategies." He removed a hand from hers, held up a finger. "First, look for places where people had trouble measuring out land. You see, things get sort of distorted around these places, these gateways, even while they're closed. You might have trouble measuring distances the same way twice. The differences would be small, but maybe big enough to cause squabbles over property rights."

"And so they asked the machines to help them find this information?"

He feigned annoyance. "You know, you're making this too easy."

Luke held up another finger. "The second thing to look for was places with funny weather around the solstices. Imagine what happens if a hole opens up between two places, when one world is enjoying sunny weather and the other is in the middle of a snowstorm. Poof! A storm brews up in the middle of a sunny day. It's actually worse than that—or better if you're looking for oddities—since even hot moist air and cold dry air can get exciting when you stir them together."

"I'll make it easy for you again. Your parents found a place that met both those criteria, and it's somewhere around here."

He pointed at the Dreamers. "Bingo."

The bleak look returned. "It was near midwinter when they came to this area, and my mother was very pregnant. But you remember how she was. If my father was going to go look for a gateway in a mountain pass on midwinter day, she would not be one to stay in town and wait. So she went with him. And they got caught in a snowstorm that came up out of nowhere."

He squeezed his eyes shut. "The people in the village know that she came down here two days later, half frozen and carrying her newborn. Me. She eventually told people that she got separated from my father in the storm and went into labor. They never found him, or any remains." He opened his eyes. "What she didn't say, of course, was that she found herself in a different world."

It was Elwen's turn to contemplate the Dreamers. "I can buy all that. But my bet is you're just getting to the really weird part."

He drew her hand to his, kissed the inside of her wrist. "You are truly an extraordinary woman." She dimpled prettily.

Even with that invitation, Luke found it difficult to continue. The habits of a lifetime die hard.

"As far back as I can remember, I've had this dream. Actually, I call it the Dream, with a capital D, because it's not like the dreams other people tell me about. This is way more vivid. And it's always about the same person."

"Person?"

"A boy, very much like me, but also very different. When I'm asleep, I share his waking life, and when he's asleep he shares mine. At least that's what my Dream tells me. His name is Lucky, and he lives in this world that my parents came from."

"Loo-ke?" She pronounced it much the same as she said "Luke," using the natural sounds of her language.

"Luh-kee," he corrected. "It means fortunate, lucky."

"How interesting."

"Yes, well." Luke soldiered on. "The story of Lucky's birth starts out the same as mine. Parents go up to the pass, get caught in a snowstorm. But this time it's the father who comes down the hill days later carrying an infant son. He re-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ports that his wife handed him the baby to swaddle and protect from the fierce winds. White-out conditions, even in the mouth of the shelter cave where they had taken refuge. He claims he took just a few steps from her, and couldn't find his way back. He spent two days frantically searching for her, even after the storm died. Finally came down out of concern for the baby."

"And people believed him?"

"From all reports, anybody who saw my parents together for more than a few minutes were convinced that they loved each other deeply."

Elwen looked at her hands. "How wonderful."

"Indeed," Luke said simply.

He shook himself. "When you're a small child, everything is new. You don't know what's out of the ordinary until you learn what's ordinary to others. It wasn't until I was five that I understood how special was my Dream. So I of course told my mother about it."

"And Lucky told his father." She dimpled again, knowing she had scored a direct hit.

"That's when my mother told me what really happened, though her recollection is a bit muddled. Giving birth unattended in a snow storm, and losing your husband at the same time, has to be a pretty trying experience for the toughest of women. There's also a kind of churning around a gateway—it's not always clear just which world you're probably in at any given moment—and that has to be confusing too. She has one memory of giving birth and handing the baby up to her husband. She has another memory of giving birth and calling out to her husband, who never answered."

"So you're twins?"

"We must be. My mother didn't know she was carrying twins, but you remember what a big woman she was. Strong too."

"And your parents set out to find each other at the next solstice. I hope they succeeded."

"I don't know. Lucky's father disappeared when he was five and a half, the same time my mother disappeared. There was a violent summer thunderstorm in the pass that day, in both worlds." Luke fought back tears. "Lucky and I both want to believe they're still alive, and together somewhere."

"In yet another world, perhaps?"

"If there can be two, why not three. Or a million?"

"Why not, indeed?"

They sat in silence for a while, fingers entwined.

"So, what does this Lucky do? Is he a woodworker too?"

Luke smiled. "Hardly. Lucky still goes to school."

"Still?"

"It's not that unusual in his world. There are *lots* of things to learn, if you choose to learn them. Lucky is studying all the things our father studied, like the motions of planets. And probability theory."

"Probability theory?"

"It's kind of like a theory of gaming. Evidently our father made a lot of money at gaming before he disappeared. He had a real knack for it. I think the churning of probabilities around the gateway somehow sensitized him to the best chances, just as it somehow bound me and Lucky together. At any rate, he left enough money for the school to take care of Lucky and educate him, in case he didn't come back."

"So Lucky is interested in gaming?"

Luke stirred uncomfortably. He was coming to the really hard part. "Uh, not exactly." He couldn't bring himself to look her in the eye.

She studied his discomfort for a long moment. Too long, for Luke.

"Mmm. At the risk of blowing my perfect record, I'm going to take a wild guess. Does Lucky have something to do with your incredible good luck?"

She had done it again. The dam burst.

"He calls it the Weaving. It's a thing he

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

can do in his world that affects what happens in mine. I'm not exactly sure how it works, but I know it takes a lot out of him every time." He still couldn't look her in the eye. "It's small things, mostly, like the odds that a ball will drop just inside the line, and you win, or just outside, and you lose. Or that someone will toss a mental coin and decide to pick you for a job instead of someone else. Or . . . stuff like that."

Elwen contemplated him quietly. She withdrew her hand from his.

"Or that some village girl you barely know will decide on a whim to go to bed with you?" Her voice was dangerously devoid of emotion.

"Yes." Reluctantly.

"Or that an old friend will suddenly decide to pay a visit? Or maybe decide . . . to do something else?"

Luke didn't know for sure about the second part, but he could guess at what Lucky would have done last night. Miserably, "Yes."

She studied him at length, her face inscrutable.

"Look, Elwen, I . . ." She held up her hand to stop him.

"Save it. I did what I did for my own good reasons. If I got a nudge or two, well . . . I was willing to be nudged." She continued to stare at him. "That's not what concerns me."

Surprised. "It's not?"

She leaned closer to him, waited for him to look her in the eye. "So what do you do in return?"

"Huh?"

"For your infatuated little wood sprite. For the guy who keeps sprinkling pixie dust on your feet, even though 'it takes a lot out of him every time.' How do you pay him back?"

Luke floundered, wishing he could look anywhere except into those piercing gray-green eyes. "Well, I, uh . . ."

"Let me guess again. He gets to watch. He gets a ringside seat on Luke and his conquests and his idyllic existence." His expression was enough of an answer.

"But I guess that's almost fair, because you get to watch when he has fun. Tell me, Luke, does Lucky have a lot of fun to share with you?"

"No. Actually his life has been pretty miserable."

"And it never occurred to you that he could maybe use a little extra help from you? That maybe you owed him something in return?"

Sadly, contritely. "No, I confess it never occurred to me." Helpless shrug. "That's the way we've always been with each other."

She leaned back, her stern expression tempered with premature sadness and wisdom. "I was a little off the mark last night, Luke. I said you felt incomplete because you hadn't suffered the scars and disappointments that the rest of us acquire over time. I think that's partly true, but I've just learned a much bigger reason. I think you're way overdue in repaying some major debts."

The bleak expression returned to his face. "Yes, I know." Tears welled in his eyes. "Now you know why I've been so lucky all my life. You know about the other place I go to." Deep breath. "You even know the name of the guy you *really* fell in love with." Startled look. Sad acknowledging nod from Luke.

"Here's the really bad part. When you feel something all your life, you don't notice it until it disappears. I always assumed that Lucky and I could sense each other only when one of us was asleep and the other awake. But a few hours ago I woke up with a nightmare. Thought I was suffocating. Then I realized it wasn't my experience, but Lucky's. Since then, I haven't been able to feel him, not awake or asleep. For the first time in my life, he's not there. And I'm scared."

Elwen touched her lips as the horrifying implications sank in. Here was yet another thing beyond her skills as a Healer.

"You said earlier that I looked as if I'd lost my best friend. Well, I think I have.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

And now it's too late to repay him for all the things he's done for me."

Lucky swam in a sea of cotton. It gummed his eyes, jammed his ears, filled his mouth with unchewable dryness. An incompetent demon had even tried to stuff cotton in his brain by jamming it up his nose with a pipe cleaner, but went on a cigarette break halfway through the job. At last Lucky understood the meaning of the hackneyed term, "death warmed over."

He wanted to wipe the stuff off his face, but his arms were immobilized. Panic surged, burning off some of the cotton. He cried out, a barely audible mumble through all the batting in his mouth. By sheer willpower he forced himself to relax, achieve a measure of calm. *Think, dammit. How did I get here?*

His last happy memory was from the Dream, of Elwen curling up naked in Luke's arms, a childlike contentment suffusing her beautiful face. Then Luke drifted off to sleep too and the curtain rang down. *Yes, that was nice indeed.*

Was there a rapping sound? He couldn't be sure. Back to sleep. Then a snicking noise. Someone was in his room. Adrenaline surged. But before he could move, a rag clamped over his face. He knew that laboratory smell, chloroform. He struggled for air, but only briefly. Then nothing.

Okay, so somebody got into his room. Not a hard thing to do, given all the janitors and maintenance people with master keys. Macalister? Not likely. He was just the probe, the one who could report when Lucky was suitably unresponsive. Greaves? Certainly the mastermind, but not one to get his hands dirty. He would have deniability, and a long list of Lucky haters to draw upon that he had cultivated for years. The biggest risk would be blackmail by the perps, but Greaves could insure against that. He commanded a broad range of untraceable bribes, and punishments.

Looks like I underestimated him. Just how much money is at stake, anyway?

A background buzz had morphed to a mumble and was now forming distinct words. The cotton in his ears was thinning. Visitors talking near a sleeping patient, that was the tone. Lucky kept up his role in the drama, hoping the voices would keep up theirs.

". . . tried to be a father to him as best I knew how." That would be Greaves. "But you know how difficult he can be."

"I'm sure you meant well, as always." Angie. Only the least bit more sincere than if Lucky had spoken those words himself.

"It was the mood swings that began to worry me the most, however. One minute he'd be depressed, the next manic. Did you see how he had changed when he left my office yesterday?" Yesterday. At least he hadn't been out for a week, despite how he felt.

Grudgingly, "He did seem more outgoing than usual. We all noticed that."

Encouraged, Greaves warmed to his task. "And then he started the paranoid accusations. I have to say it really hurt, to be so distrusted, after all I've done for him. After all *we've* done for him at Jude's."

No response.

"I suspect he started self medicating when he couldn't manage his moods any more," Greaves drove on. "Downers, the police call them. That's most of what we found in his room. We still don't know how much phenobarbitol he took last night, but his blood test showed a dangerous level." A tsk-tsk sound. "Good thing Macalister and a couple of his dorm mates cared about him enough to keep an eye on him when he began oversleeping so much, or we might have lost him this time."

Finally, a mistake. Angie knew campus society too well to swallow that one. And she knew that Greaves wasn't naïve enough to believe that scenario himself. Maybe he could counter the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

chancellor's well knit fabric of lies after all. *If I can ever get in front of an impartial authority.*

"But do we have to keep him strapped down like this, and all locked up?" Angie again. If she had any doubts, she knew better than to discuss them with Greaves. But she couldn't suppress her maternal instincts. "The boy has never been violent."

"Angie, dear," condescendingly, "you must remember what they taught us in the substance abuse program. Once these kids start down a path like this, you have to be firm. Otherwise, you're just aiding them in their own self destruction. Besides, it's only until tomorrow." *Tomorrow? What happens then?*

"Looks like he's waking up." Lucky must have frowned while she was looking his way. *Well, time for the second act, I suppose.* He made additional Hollywood waking-up noises. Opened his eyes. The Sun was just setting, well South of the Sleepers. *Almost the solstice. Not that that matters now.*

Angie was bending over him with a worried smile. And one of those silly little nurse's caps that nobody wore anymore. Of course, she was the night nurse in the infirmary. In a small private school, everybody does double or triple duty, as a justification for cranking up their pay from downright exploitive to almost mediocre. Her husband was the night guard—they had a small apartment on the ground floor—he was once a star lacrosse player at Jude's who could never make it in the real world. Naturally, he hated Lucky's guts.

"How are you feeling, Lucky?" Genuine concern. Greaves humpfed impatiently in the background.

Surprisingly, he found he could speak, after a fashion. The cotton had dissolved in his mouth. Now it merely felt as if a particularly unhygienic camel had stepped in it.

"A little fuzzy, I guess," he croaked. "I could sure use some water." She scurried to the bathroom, returning with a pitcher and glass. Propped his head up as much as possible. She glanced from the straps to Greaves, looking half annoyed and half pleading. He merely turned to look out the window. Lucky drank gratefully, with just an occasional dribble.

The room became familiar. It was the one in the infirmary at the end of the hall, reserved for rich kids, measles cases, and the occasional student who lost it. The only room with barred windows and a door lock that could be set so it couldn't be opened from the inside. The students called it Solitary.

"Thank you, Angie," said Greaves, insincerely. "Now let me talk to the boy." She let him take her place by the bedside, parked herself by the bathroom door. Greaves glowered at her, but she stood firm. She was not going to leave. He shrugged.

"Well, Lucky, it looks like you've pushed your luck a bit too far this time." So he was going to talk in code, with Angie present. Lucky could guess his intent well enough anyway. He could have mimed with sock puppets, to equal effect.

Lucky just looked at him. He tried to imagine how the janitor would look of a Monday morning when contemplating a student toilet spattered with barf.

"I tried to give you proper guidance yesterday, but I'm afraid you're still too young and hot headed to listen. Of course, I also blame myself for not trying hard enough."

Maybe with bits of partially digested chili peppers in the barf.

"You know, we can still keep this from getting any worse. But you'll have to admit you need help before we can help you. Cooperation is always better than coercion."

And Romano cheese, the really smelly kind.

Greaves tried to stare him down then, a tactical mistake. Lucky still had a long list of pizza ingredients at his disposal.

The chancellor boiled over. Angie

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

took a step forward, lest he attack the helpless Lucky. "All right, young man. Here's the situation. Tomorrow morning you'll be examined by two doctors who will, I'm sure, reach the obvious conclusion about your behavior and sign the necessary papers. My brother runs a very effective drug rehab program for kids like you. And he's very good at holding your attention until you learn to behave responsibly toward yourself and others."

A smile completely devoid of humor. "Now, I suggest you clear your head and start thinking hard about how you want your life to look for the foreseeable future. Your options have just gotten very limited." With that, he stormed to the door and yanked at the knob. Unfortunately for dramatic effect, the door was locked. He had to wait while Angie buzzed her husband to come let them out.

Lucky was happy to be rid of Greaves for now, but his situation was still dire. Here he was strapped to a bed, framed as a drug addict, and only hours away from being locked up in the worst kind of prison imaginable. They could keep him doped up and preached at indefinitely. And every indignity, every torture would be For His Own Good. That was not a threat to be taken lightly.

Meanwhile, of course, Greaves would be having his way with all the wealth that John Sites had accumulated for the disposition of his son. The chancellor would make a public show of playing "What would Lucky want?" of course, but he'd do what he had been intending for lo these many years. It was his father's betrayal that galled Lucky the most; the wealth was still too abstract a thing for him to feel as a personal loss. At least so far.

Lucky had no plan. He knew better than to plead with Angie. Even if he could wear her down, there was no way her mean-spirited husband would let him leave the building. He was trapped.

He tried not to think about his bladder, lest the urge to pee become overwhelming. He tried to relax enough to sleep away his current discomfort, but he was too worked up and too slept out for that. All he could do was cycle through the same thoughts over and over, as the hours crawled by. The sadistic part of Greaves must be very content right now.

Luke awoke to a darkened room. His last waking memory was of Elwen rubbing his temples and singing softly. She had brushed aside his insistence that he could never get to sleep in daylight, and certainly not today. "You say he's still alive. You have to find out what's happening with him." End of discussion. She draped a blanket over the window, helped him undress, then treated him to the most soothing massage he had ever experienced.

He stumbled across the room, pulled down the blanket. Night. Early evening, from the amount of foot traffic and the muffled sounds he could hear coming from the inn. Muffled. It was snowing, lightly but steadily.

He struck a light. There was a note pinned to his robe. "Gone to check on Kandra. Back soon. Love." No need for a signature.

He wanted to talk to her about Lucky, but that would have to wait. Elwen's quiet confidence about Kandra's delivery faded with each visit that day. Now she was showing definite concern. Luke agreed that babies always have top priority.

It had been a helluva day. Elwen the gentle, Elwen the loving, had turned into Elwen the slave driver. Luke wanted to curl up and grieve the loss of his soul mate, but she would have none of it. He had to talk to Karive and he had to talk to Karis *now*. He had kept both waiting for answers far too long. She relented only long enough for a quick shower and breakfast. At least she had joined him in both.

Karive was in the showroom, dusting

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the wares and laying out new items in that meticulous way she had. "Morning, Luke. Sleep well?" A half-joking smile. She always said that when she knew he had company for the night. If she was ever jealous, she hid it well.

"Good morning. I need to talk to you." She caught his tone. Pursed lips, raised eyebrows, and a contemplative nod. She knew what was coming. She put down her duster and scraped two stools together, to what she judged was the right degree of intimacy for what he had to say. She was pretty close to the mark.

"Okay, shoot."

Luke was determined not to hem and haw. He didn't want another lecture from Elwen, for one thing. But he also knew he owed it to Karive.

"I love you, Karive. But I don't want to marry you." Pause. "I can't honestly say I'd make a fit husband for anybody right now, but I'm working on that."

Again the purse-lipped nod. "Thanks, Luke. I love you too. And I have to admit I was expecting you to tell me that sometime soon. It's okay." She patted his knee. Then, "I'm really glad you and Elwen finally got together. She really needs you."

His head swam. Did everybody know more about his life than he did himself? "Uh, I'm not sure how 'together' we are. She keeps telling me all the things that are wrong with me."

A wave of dismissal. "I can't imagine anybody better for the job." She looked him in the eye, stern but smiling. "So, how's her accuracy?"

Luke smiled in turn, looked down at the floor. "Almost perfect, I have to admit. Seems I've been getting steady doses of humility for the past day, from a variety of sources." He tried not to think about Lucky.

"Humility is good for the soul. Get used to it." The smile was still there, but with a bit of an edge this time. *Okay, I had that coming.*

"Uh, I just want you to know that I'm not dropping you for Elwen. I meant what I said: I don't think I'd be good for her either."

"Then get good." The edge was even harder. Luke looked at her in surprise. She took his hand to soften the blow. "Luke, you're a wonderful guy in a lot of ways, and you've had it pretty good these past few years. Deservedly so, I think. But you're not perfect, and you're not always going to be the center of the Universe."

She pumped his hand for emphasis. "Elwen loves you, Luke, she always has. Seems everybody has known that but you. And now she *needs* you, or at least the person you can be. You owe it to her to be that person for her." A mist clouded her eyes. "Believe me, you'll be well rewarded for the effort."

Luke nodded. Nodded again. It was time for him to grow up. There was nothing more to say.

Karive came to him then and hugged him, first tenderly, then fiercely. He returned her intensity. She pressed her cheek to his. It was wet.

"I know you're going to talk to Dad next, but give me some time with him first." She could feel his nod with her cheek. "I'll come get you when he's ready." Then she ran out. Not in the direction of Karis's office, but toward her own bedroom.

Snow pattered against the window. The wind was picking up. Perhaps Luke should go hunting for Elwen. *Did she dress warmly enough?* He smiled at himself. She had certainly stirred up his protective instincts. Of course, it didn't hurt that half the village had already appointed him as her guardian. Or so it seemed. The thought brought him back to his interview with Karis.

"Come in, son." Graying at the temples, but still full of energy and good will. Karis patted the chair next to him at his ledger stand. A small stack of ledger books waited there, at the ready, and a single sheet of paper, half filled with an itemized list of figures.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"I'm sorry about Karive, sir," as he sat down.

A light wave. "Don't be. She'll get over it soon enough." Conspiratorial lean. "Between you and me, there are at least three guys who've been waiting for you to get out of the way before they make their moves. She'll enjoy being the belle of the ball for a while. Unfortunately, I know which one is likely to become my son-in-law. Pain in the ass, but Karive will soon shape him up. Trust me."

Luke knew he could indeed trust Karis in this arena. He was an astute observer of humankind. Not to mention a loving father. Luke's guilt eased perceptibly.

"Your timing is almost perfect, as it turns out. Your mother asked me to sit down with you on your twenty-first birthday which, as I recall, is tomorrow." Luke started to interrupt him, bit his tongue. He could say his piece after Karis discharged his duty.

Karis began detailing the assets he had been preserving on Luke's behalf over the years. There was his mother's wealth, not insubstantial despite the notoriously poor income that most Healers enjoyed. All detailed in the smallest ledger. His stipend as an apprentice, carefully noted in another ledger and banked on his behalf. A larger stipend since his eighteenth birthday, in the same ledger. And a share of the profits from the new products that Luke had introduced, carefully detailed in yet another ledger. With each line item ticked off, Luke watched his fortune grow. By the end of the sheet the total was staggering. A careful man could live a decade or more on those reserves alone, without doing another lick of work.

"Uh, sir, you don't owe me all this. I was just an apprentice, after all." Both knew that many a master would have pocketed all of these sums, including the money from Luke's mother, with nary a qualm. It was almost expected.

"And a damn good one, I should say." Karis smiled benevolently.

"But you took me in, and raised me as one of your own. I must owe you something for food, clothing, and housing."

"You did your share of chores, and then some. You were good company. Payment enough." Again the benevolent smile. Karis was obviously enjoying himself.

Luke hesitated, but the thought of another Elwen lecture drove him on.

"I really appreciate your generosity, sir. More than I can say. And I know you want me to join you in the business. That makes it all the harder for me to say what I need to say." Karis waited, looking neutral but encouraging. "Sir, I feel I need some time off before I do something like that. I need to travel some. I need to, I don't know, just grow up a little I suppose. I can't imagine anyone I'd prefer to work with for years to come, but I'm just not ready to begin right now."

Karis let out an exaggerated whoosh. "Is that all? I was afraid you were going to set up competition across the street." The booming good will returned to his voice. "Not that I could blame you if you did. You'd run rings around me."

He clapped Luke on the back. "You want time off? Start first thing tomorrow. You always take your birthday off to go hiking anyway. Hell, start right now. We're overstocked as it is. Been thinking of closing up the workshop for the midwinter celebration anyway." Benevolent smile again. "When you're ready to get back to work—next month, next year, whatever—we'll be here and waiting."

Luke took the older man's hand in both of his. "Thank you, sir." He fought back tears.

Karis harrumphed, busied himself making a tidy stack of the ledgers. Pointedly changed the subject. "So, Karive tells me that you and Elwen are an item. 'Bout damn time, if I say so. You're lucky to get her. But then, you've always been lucky." No trace of envy or resentment.

This was getting repetitious. "I'm not

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

so sure we're an item, sir." Then, bleakly, "And I suspect my good luck has pretty much come to an end."

"Well, if it lasted long enough for you to land Elwen, that's luck enough."

A little exasperated. "Elwen has made it pretty clear that she needs me to change in certain ways, and I understand why. I'm just not sure I can do it well enough or soon enough for her."

Karis grew sober. "Son, let me give you a slightly different perspective. I see that you're trying hard to grow up. You've been decent to Karive and to me today. You're trying to plan your future carefully. Now it's time for you to start thinking of the community that has taken care of you all your life. Time for you to do your share. Maybe even more."

Pensively. "Every once in a while a woman comes along with a soul about half again larger than normal. Gillian, your mother, was such a person. So is Elwen. Both were drawn to Healing, no surprise." He looked at Luke. "That's a terribly draining profession, one terribly important to the community. But somehow the community never finds enough financial or emotional support to repay Healers properly. Every Healer needs someone to make up the difference, or she burns out way too young."

Luke remembered sparkling gray-green eyes, tempered with premature sadness and wisdom. He knew what was coming.

"Like it or not, you're the best candidate for Elwen. You don't have to be perfect at it, just good enough. But you have to do it." He gestured at the ledgers. "You have the financial resources, you'll find the emotional resources. Love counts for a lot, in these matters."

Karis gripped his arm, smiled encouragingly. "You get your traveling out of your system. Take care of yourself a bit, so you're strong enough for others to lean on. Then get your butt back here before it's too late and marry that woman. Do that and I promise you you'll have all the luck you'll need for a lifetime together."

Luke's reverie ended in a blast of snow and icy wind. It was getting colder. Elwen pushed the door closed with an effort, shook off snow, began unpeeling scarf and cloak. Luke sprang to help her, wrapped his arms around her. She was shivering.

"Mmm. That's nice. Maybe I should go out and come back in about once an hour." She kissed him then, almost hungrily. He cupped her chin, caressed her cheek with his thumb.

"How's Kandra?"

"Not good, but hanging in there. Every time she starts to go into labor, the baby falls asleep or something and everything stops." She slid her icy hands under his shirt, smiled impishly when he jumped. "The kid isn't even born yet, and is already being a brat." She looked up at him, brow creased with worry. "If the baby doesn't come soon, I'll have to induce. That has its own dangers."

Her hands warmed against his skin. She captured his gaze. "And what's happening with Lucky?"

"Not good either, I'm afraid." Her shivering had stopped, but she was still cold. He pushed her onto the bed, removed her shoes and his own, then wrapped himself around her to finish the warming job. She did not protest.

It took a deal of explaining to convey Lucky's peril. Drug addiction and forced rehabilitation were concepts too alien for Elwen to grasp easily. Her powerful intuition worked best with people behaving more or less humanely, however shortsighted they might be. Eventually, she got the picture.

"To be locked up like that, and drugged, all in the name of curing a drug habit. What an awful fate." She shivered, this time not from the cold. She stroked his face. "And you. You'll have to live that with him. I'm so sorry."

"Lucky can just capitulate, you know. All Greaves really wants is control of the money."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Do you think he will?" Half hopefully.

Luke considered, shook his head. "Not if I know Lucky."

"It seems so hopeless."

"There is one possibility, a remote one." She heard the shift in tone, saw his face, understood.

"Luke, that could be dangerous."

"I know. But I think it's time for me to stop taking the safest path. And start repaying some debts."

"Do you even know how?"

"I'm not sure. But I have to try."

She clung to him with ferocious strength. "I don't want to lose you."

"I don't want to lose you, either."

She relaxed her iron grip, stroked his face again. "How can I help?" The simple, raw courage of a Healer.

"I'll be unconscious for a while, if I do it right at least. Don't know for how long. Hours. You might have to keep me breathing at times, since I lack Lucky's experience."

"Okay." A long kiss, very hungry this time.

"See you on the other side."

Then Luke went into the Weaving. It would have been a difficult Weaving for Lucky, with all his practice. For Luke, it was an act of desperation. He had no idea what it would do to him, or whether he could even succeed, at any cost. He simply could not leave Lucky in peril without at least trying to change his fate. He would have to tie a granny knot in the laws of probability, despite the possibly huge personal cost.

Whatever all those adventure stories might suggest, prisoners rarely escape their captors. And Lucky was the victim of a determined man with ample authority and a convenient lack of scruples. What are the odds that a well oiled door would not latch and lock when pulled closed in haste? Or that an otherwise meticulous nurse would dwell overlong on a personal phone call before returning to check up on her important patient? Or that a perennially suspicious and officious guard would be called away by a mysterious noise at just the right time? It was far too much to hope for, more than even a kindly demigod could deliver on short notice.

But Luke went into the Weaving. He would play God with probabilities whatever the cost, if only as partial repayment for years of sacrifice by his friend and soul mate. So Luke went into the Weaving, the Weaving of improbabilities.

"Do you need anything, Lucky? More water, perhaps?" Angie was leaning over him, mixed pity and concern in her eyes. Lucky had somehow drifted off to a fitful and tormented sleep. Except for a dim ray of hope from the Dream. *Thanks, Luke, however this turns out.*

"Uh, I really need to go to the bathroom." He didn't have to fake the distress in his face and voice.

Angie looked pained. Collected a bed pan from under the bed. Hesitated. Lucky glanced at the barred window, at the locked door. He let the situation speak for itself. She made up her mind.

"Well, there's no reason for you to be in misery all night." She reached for a buckle.

"Thanks, Angie," simply. A bit more work and he was free. He flexed his arms gingerly. Just a bit stiff, except for the left bicep. Lucky massaged it. *From the injection,* he concluded.

"You'll find pajamas, robe, and slippers in the bathroom, dear. I'll be back soon." She removed a piece of cardboard from the door latch, pulled it open, and hurried out. Lucky waited for the closing snick. It never came.

He wanted to secure that door, before the lock changed its mind. But Angie might be near, and hydrostatic pressure was building. Now that the bathroom was just seconds away, his bladder was demanding priority. He gave in to it.

He dumped soap out of a little box on the sink, flattened the box and folded it

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

once. Armed with his own version of Angie's cheater, he crept up to the door. Brought his hand slowly down upon the knob. *Don't push, just pull.* He grabbed and yanked. The lock snicked, but too late to catch. Lucky leaned against the edge of the open door and exhaled. Carefully, he positioned the cardboard and closed the door upon it.

Now into the pajamas and robe. Not much protection against a December night, but better than just his underwear. The thin slippers offered even less insulation. Time to make his escape.

Lucky spotted a clipboard atop the dresser. Angie must have left it behind. A puckish thought seized him. He removed the pen, peeled off a blank sheet from the pad, and wrote, "Chancellor: Decided to take a walk and clear my head, as you suggested. Back soon. Merry Christmas. Lucky." He admired the multiple ambiguities for a moment, then propped it on his pillow.

He opened the door carefully once more, capturing the cheater, let himself out, and closed the door quietly. Snick. Then he peeled off a small piece of cardboard and worked it into the keyhole as deep as he could. *That should slow them down.*

His confidence in Luke's intervention was building, but Lucky remained cautious. He walked quietly down the darkened hall, listening for noises. Perhaps that was Angie on the phone two doors away. Down the steps and around the corner. Talk radio mumbled from somewhere near the guard's station, but all else was quiet. Finally, Lucky screwed up his courage and walked boldly out the front door.

He didn't dare go to his room. Too many enemy jocks to get by, even if his secret key was still there. But his lockup in the basement offered some hope. He slipped through the battered door, chanced a light. He needed it to work the combination, sort through his stuff. There was his pack, made ready for his solstice trip. A treasure trove of bedding and granola bars. But he needed warmer clothing. Best he could do was some sweat pants and a thin baseball jacket. And, wonder of wonders, some worn out sneakers. Even a tourist knew better than to dress that way for a night among the Sleepers. He put the pants and jacket on over the pajamas, then redonned the robe. *Not very stylish, but it'll have to do.*

Slipping out of the basement, Lucky started for the woods, then hesitated. Hiding out would merely postpone the inevitable, and probably make it worse. He needed an ally. He veered off toward the edge of campus and a nearby gas station. Nestled back between the men's room and the air pump was a pay phone with that rarest of jewels, an intact phone book. He pawed pages until he found Soames, J. *Thank God his number is listed.*

It took him three tries to get his phone card number entered properly. Lucky's gift for memorizing numbers was seriously compromised by residual clots of cotton in his brain. Finally, he got audible ringing, a click.

"Hello?" An elderly woman's voice.

"Mr. Soames please."

"Who is this?"

"My name is Lucky Sites, ma'am. I'm sorry to be calling at this hour, but I really need to speak to Mr. Soames."

Cranky, "Just a moment." A protracted silence.

"Soames here."

"Mr. Soames, it's Lucky Sites." Another protracted silence.

"Lucky, where are you calling from?" Guardedly.

"Uh, I'd rather not say. I will tell you that I left the infirmary a short time ago." No response. "Mr. Soames, I'm not a drug addict."

"You may have a hard time proving that, Lucky. Simon Greaves made a point of sending us a copy of your blood test. And the list of drugs allegedly taken from your room. Some people would call that a *prima facie* case."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"If it was my blood, and if the test was correctly administered, then all it proves is that I had phenobarbitol in my blood stream. Not that I voluntary ingested the drug. Or am in the habit of doing so. And I don't think I have to tell you how easy it is to plant drugs on someone."

Pause. Chuckle. "You in pre-law by any chance, son?"

"Nossir."

"Well, you might want to consider it, if it's not too late."

At least he was loosening up. "Mr. Soames, I have to tell you that I had no idea before I called you yesterday that there was any serious money left in my father's estate. I'd now like to ask you for an estimate of the total worth of that estate."

Another silence. He hoped that Soames was reflecting on his duty. Finally, "In round numbers, I'd say about eighty million dollars."

Lucky almost dropped the phone. "Uh, is that an eight with seven zeros after it?"

"Mm, yes, that sounds right. Understand, not all of it was earmarked for you, personally, Lucky. Maybe half of it is to be dispensed to various institutions. At your discretion, of course."

Lucky's mind struggled against the residue of the drug. How could he get Soames on his side, or at least keep him neutral?

"Uh, first let me say just, wow." Then, "I don't want to make any accusations, but it does look to me as if one or more parties would rather I didn't assume control of that money, as my father had intended."

A little less guardedly. "If you're not making any accusations, and I think that's a wise position for someone accused of paranoia, then I would say that yes, a disinterested third party might also be led to that conclusion." Soames certainly enjoyed swapping lawyerly abstractions.

Okay, let's go for it. "Sir, I could really use some advice on how best to get myself out of this pickle." Pause. "I hope that you can supply that without any conflict of interest."

Another considering pause. "I think I can make a case that you are now my client, Lucky. I know that's what Jack Sites would have wanted. He was a good man." Lucky breathed a sigh of relief. "But understand, I'm not one of those TV lawyers who play fast and loose with the law. If a judge asks me to turn you over and I know where you are, I'll do my duty as an officer of the court."

"I wouldn't want it any other way, sir."

A long pause. "I can't see getting much done between now and Christmas, Lucky. On the other hand, I think I can manage to keep anybody else from getting anything done as well." Chuckle. "If you can keep out of sight until our scheduled meeting on Monday, I can get a few ducks in a row. I think at least one of those ducks had better be a trustee for Jude's."

"I think I can manage that, sir. Uh, what are the chances I'll make it the last two blocks to your office on Monday?"

"Good point. I'll put in a word with Joe Malone, the Chief of Police. Joe and I used to play poker with your dad. Lucky for you, he let us win sometimes." A deeper chuckle.

"I can't thank you enough, sir."

"Don't thank me until this is over. We still have an uphill battle on our hands Monday. That drug thing is going to be hard to explain away."

"I understand."

"Okay, Lucky. God bless. Merry Christmas. And stay warm." Click.

Lucky headed back toward the woods. Found the broad walking path that led past the outermost housing developments to the foothills. Soon he was climbing the familiar hiking trail up to the Sleepers. It was dark, but he knew his way well. He could travel these routes by sky shine alone. With each step his head cleared a bit more. The sooner he metabolized the last of the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

drug, the happier he'd be.

He crested the hill and entered the pass. The shelter cave loomed like a giant mouth, just off the North side of the trail. Old photographs showed a deep overhang, draped with sturdy vines, adding a spacious shaded porch to the cave. But that was mostly gone now, reduced to rubble that littered the mouth of the cave. Apparently a lightning strike brought much of it down, in both worlds, on that fateful day his parents revisited the gateway. If the strike hadn't killed them, it probably smothered the gateway with rock and prevented their return. Neither he nor Luke had found a hint of a gateway despite much excavation and a score of solstice visits.

He worked his way through the breakdown, entered the part of the cave known to serious campers. He dropped his pack. On hands and knees, he combed a three by six foot area for small pebbles before spreading out his bedding. He had a full canteen and a decent spring nearby. With ample supplies of gorp and granola bars, he was set for several days in moderate comfort. *As long as the weather holds.*

Even fully dressed, he was just warm enough in the sleeping bag. As he drifted off to sleep, he tried not to think about solstice storms. Maybe they'd leave him alone if he ignored them.

That superstitious strategy worked for just a few hours. Lucky awoke to a dull howling. The temperature was dropping. Sleet stung his face. He scrunched deeper into the sleeping bag, pulled the flap over his forehead for added warmth. It wasn't going to be enough.

He tried to imagine a better shelter to ride out the storm, but he knew of none. It was ironic that the gateway he had been searching for all these years was now advertising its presence just yards from where he huddled. Yet he dare not stir from his inadequate cocoon lest he weaken his prospects for survival even more. A part of him wondered if Greaves would wrest control of his estate, should he die on this hilltop. But he shoved such thoughts aside. Right now, the name of the game was survival, nothing more.

Luke woke up shivering. Elwen was at his side in seconds. Like mothers and nurses throughout time, she was attuned to her charge even as she dozed. "Luke, are you okay? What is it?" She wrapped herself around him for warmth.

Slowly the shivers subsided. Luke opened his eyes. Most of the effects of the Weaving were gone now, but he was still a bit disoriented. He sat up. Elwen studied his face with a worried frown. Waited.

"Well, I got Lucky out of his prison. That's the good news. But he's simply traded captivity for mortal danger." He gestured at the window, in the general direction of the Dreamers. The howling storm was extending the night and rendering the window opaque. "He's up there, and he's slowly freezing to death."

Luke looked at Elwen with a mixture of awe and fear. "The gateway is open."

Then he was up and across the room. He opened a cupboard and began digging things out. Mittens, woolen blankets, rope, a worn but sturdy pair of snow shoes. He found a pack and began stuffing it.

"Luke, what do you think you're doing?" A little frightened.

A determined gleam in his eye. "I'm going up to the Dreamers, of course. This time, I'm going to find that damn gateway. And I'm going to go through it and help Lucky survive the storm."

"Have you looked outside? There's over a foot of snow here in the village. It has to be worse in the hills. And that wind! You'll never make it."

"I can try. Please don't try to stop me."

She folded her arms. "Will you try to stop me if I go with you?" That slowed him down.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Of course I will," softly. "You're a Healer. You're needed here far more than I am. Kandra needs you right now." Pause. "If I don't come back, please tell Karis that I want you to have everything he's saved for me. He'll understand."

To his surprise, she wasted no time on refusals or histrionics. "Okay. But you need to control your panic. Slow down. Let me help you pack properly. Get something to eat. You'll be no good to Lucky if you go off half prepared." Very quietly, "Or to me." He took a deep breath, acquiesced.

An hour later, he was bundled up and out the door. Five minutes of that time was spent saying goodbye. Both knew he could probably survive the weather, brutal though it was. The gateway was the wildcard, one he would have to finesse twice if he were ever to return. Death was easier to contemplate than a lifetime of separation.

An easy three-hour climb from the edge of the village. That's what the locals opined on a crisp fall day with wood smoke in the air. Ask one on that particular day and you'd get a markedly different opinion. If you weren't considered insane simply for asking. It was a measure of Luke's determination that he made it in four and a half.

It was a measure of Luke's desperation that he then wasted half an hour flailing about. He was reduced to shouting Lucky's name into the gale, until exhaustion brought him to his knees, fighting back the crushing fear of defeat.

A few yards away and a couple of universes over, Lucky stirred in his sleeping bag. He couldn't feel his toes. Breathing on his hands no longer changed numbness into pain. He was almost too tired to shiver. He knew from the Dream that Luke was trying to reach him. *So near and yet so far.*

But he couldn't just give up. If there was anything left to try, he was determined to try it. Maybe he could help Luke find the gateway even if he arrived too late to save Lucky. That would be a partial victory. He would go down fighting.

Then Lucky went into the Weaving. It was the most difficult Weaving that he had ever contemplated, even in the best of physical condition. To the extent that he could fathom the price he was likely to pay, his mind shied from considering the full consequences. No stretching of the laws of probability would serve this time. He would have to shred them.

What were the odds that Luke could find a gateway that had eluded them both through a score of searches stretching over most of their lives? If fair weather and a clear head had yet to succeed, what would a blinding snowstorm and a half-blind panic do to improve the odds? Lucky made no attempt to quantify the answer. He could state the chance of success quite succinctly—jack shit. His talent for tinkering had at last met its match. It would take a . . .

But Lucky went into the Weaving. Desperately, all but hopelessly, he grabbed the fabric of chance with both hands and rent it for all he was worth. So Lucky went into the Weaving, the Weaving of miracles.

Luke made himself stand up. *Think, dammit.* The storm was in this world, flowing into Lucky's. Amid all the swirl and counterflow there had to be a general trend. He ditched his snowshoes and stumped all around the mouth of the shelter cave trying to feel a bias in the wind. There was none. Or, if there was any bias at all, it was . . . up.

Luke scrabbled up the path beside the cave, feeling his way over familiar ground when the blowing snow got too thick to penetrate. He remembered a spruce tree on a small hummock. Yes, there it was. He would use it as the origin of his coordinate system.

He uncoiled his rope, tied it firmly to the tree. Coiled the remainder around his middle so he could measure it as it paid out. Then in a descending series of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

arcs, he swept the slope leading down to the shelter cave.

This is taking too long. He unwound an extra six feet of rope for his next pass. He could get more cautious as he neared the lip of the broken overhang. He stepped off, onto windswept ice. Lost his footing and fell. Skittered down the frictionless slope toward he knew not what. Frantically, he took a double turn of the rope about his mitten, lest he turn into a whirling top. The overhang ended sooner than he thought. He flew off into a featureless white abyss, and miraculously (of course) he fell into the gateway.

The rope jerked taut. He hung there, swaying gently. Pain lanced through the overstressed arm. Frantically he undid the coils about his middle and let them drop. Caught the rope with his legs and hitched himself up until he could free the pinched mitten. *Much better.* Only then did he look around. Or tried to.

Whatever he may have expected, this wasn't it. Well, it probably wasn't it. But it also possibly was. In fact, the gateway was possibly just about anything he could imagine, even the impossible. Luke's mind spun as alternate worlds contended for control of this crossroads in space and time, each Weaving its own rich fabric of winners and losers. His mother had written about the confusing churn of probabilities around a gateway. Now he knew exactly what she meant. Or probably meant.

He scrabbled for a mental anchor. *He* was real, to a high degree of probability. So was the rope to which he clung. And it very probably stretched back into his world. But where it went below was another matter. Right now, it looked like it was falling into . . . *no, don't go there.* With the thought, the view changed to something more benign. It was almost like turning your head, about an axis he had never before imagined.

He <turned> and the ground below became moss covered stone. He was getting the knack of it. He <turned> again and saw driven snow. It felt like his own world, for some unfathomable reason. He made a mental note of <where> that was. He <turned> again and saw writhing branches reach toward him. Quickly he <turned> to the <place> he thought of as home.

But <where> was Lucky's world in all these possibilities? He could search forever and never find him. He lacked the experience to Weave a successful outcome, like Lucky, or spot the winning chance, like his father. He needed a guide. *Of course—the snow.*

Luke followed the rope up until he could see snow fly. He <turned> slightly and the snow was visible further down. Again, more snow. Whoops, overshot. Inch by inch, he followed the storm on its journey between worlds. It enveloped him now, crept down the rope.

. . . wonder if that's frostbite . . . damn cheap baseball jackets, should make 'em fur lined . . . have to write a business plan . . . where the hell's Luke, anyway . . .

The thoughts pummeled his brain, weak as they were. *Found him!* Luke shinnied down the rope with immoderate haste. Landed in snow that hid treacherous rocks. He swam through drifts, clinging to the rope like the lifeline it was, until he reached the small maple that grew near the shelter cave in Lucky's world. Tied the rope firmly to the tree. Only then did he hunt down Lucky.

Luke tried to remember the running lecture Elwen had given him as they stuffed the pack. She had hammered him about the use for each salve and potion. None of that slowed him in his haste to erect the canvas windbreak. He'd use the medications later. All he cared about now was making a protected space big enough for him and Lucky, just big enough. Her last words were the same as her first, "Get him warm and keep him warm."

The hard part was tuning out Lucky's thoughts. They got mixed up with his

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and confused him repeatedly. But the job was soon done. Luke wormed his way into the shelter and wrapped himself about Lucky. Luke was treated to one last wisp of thought as first Lucky, then he, drifted off to sleep. *'Bout goddam time you got here.*

They slept, on and off, for several hours. Lucky was exhausted both physically, from the cold, and mentally, from his desperate Weaving. Still, the improved insulation and extra body heat worked their combined magic. Lucky awoke to pain several times as various extremities thawed. Each time, Luke awakened too. He applied salves and stimulants carefully, determined to avoid the least criticism from Elwen should his ministrations be subject to a future review. "Whatever you do, *don't* rub frozen flesh." He recited her mantra to stay focused and drive out Lucky's echoing thoughts.

Eventually, both awoke naturally. The storm had abated, but even with the lesser wind and snow it was still cold. They stared at each other for the longest time, both trying not to think, but with limited success. After a number of failed experiments, they stumbled across an effective trick. If each spoke most thoughts in the other's native language, the echoes stayed under control. It even gave them both a chance to work on their vocabulary and pronunciation. Here, the instant thought feedback from the native speaker proved to be a marvelous learning aid.

They crawled out of their cocoon and looked around in the fading light. The rope was still in place, holding firm. They found a different camp spot better protected from the storm, by some fluke, and built a fire in the well used pit. Lucky shared out granola bars and water. At Luke's insistence, they checked Lucky's extremities one more time, applying more salve. Just the least touch of frostbite on one toe, but it would heal. Elwen would be pleased.

Through all their activities ran an undercurrent of speculation, half thought, half spoken. About the gateway, and how long it would stay open. About ways to catalog and mark the plethora of alternate worlds that now lay before them, particularly their two home worlds. About their parents, and where they might be. But the recurring question that shuttled between them was, "Why are we like this?"

Lucky probably had the thought first, but it was hard to tell. It was certainly he who made the first move. Approaching the fire pit, he selected a rock besooted by years of campfires. Extending his right hand, he rolled his thumb across the grime, leaving a clean, distinctive print. Luke joined him and repeated the process, right next to Lucky's mark. They studied their work in the flickering firelight.

The thumbprints were identical.

Years of worry, self doubt, and speculation crystallized between them. Lucky the studious one who couldn't talk to girls. Luke the charmer who lived for the present. The common traits that blossomed in one, but not the other. The shared sense of being somehow incomplete. Now they both knew why.

By some hiccup of probabilities, perhaps through some brief loop in time, one newly minted person had set off on two paths at once. For the last twenty-one years, they had existed in separate worlds, looking like separate people, yet each not quite distinct, not quite whole. And through all these years, across these different worlds, they remained mysteriously bound by that common fetal beginning. They were Siamese twins, joined at the soul.

Through the night they hashed and rehashed their predicament. No surgeon could slice them apart. No Healer could make either fully whole. Between them, they had the ingredients for at least one decent person, but no instructions for performing the rearrangement, or duplicating the shared parts. Any repair work they would have to perform by them-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

selves, upon themselves, acting as a team.

By morning light they had made their joint resolve. It would have to be done in the footprint of the gateway, bloated by the passage of the solstice storm, where it's not always clear just which world you're probably in at any given moment. The place where they were born. They laid out their bedding, set up their canvas windbreak as protection against the dregs of the storm. Crawled inside and hugged each other, perhaps for the last time.

Then Lucky/Luke went into the Weaving. Neither could tell who might live and who might die. Either or both. The wildest of chances had split them shortly after birth, leaving each achingly incomplete in some undefinable way. Both were willing to risk all for that sense of humanity that had eluded them throughout their lives.

Life is improbable enough, on its own merits. Maybe a fluke or two and a few billion years of natural selection can lead to a toad or an anthill. Six feet of DNA coiled and stuffed into the nucleus of a human cell makes a tidy dress pattern for toenails, spleen, and brain. But where in that skein of protein factories lies the recipe for self awareness? To be alive borders on the miraculous. To know that you're alive crosses the invisible line into wonder. To sense that you can be more alive inspires awe, and hesitation.

But Lucky/Luke went into the Weaving. Whatever the outcome, it had to be better than all these years of living apart and not apart, separate but not distinct. So Lucky/Luke went into the Weaving, the Weaving of souls.

Lucky Luke removed his snowshoes at the edge of the village. It was a relief to walk on packed snow after the laborious descent from Dreamers' Pass. It was just beginning to get light, but the streets were still deserted. The last night of the midwinter celebration was always the rowdiest. Today was one of those rare days when the whole village slept in.

He parked his snowshoes outside the door and let himself in quietly. Empty. *Has she left?* No, Elwen's bag still sat in the corner, a couple of items of clothing laid neatly on top. Maybe she was on a house call, or sleeping off a party at a friend's place.

He walked around the room, touching things. So familiar and yet so new. He stoked up the fire. He went out to the heating shed and stoked up the boiler too. Elwen might enjoy a hot shower when she returned. Then, on impulse, he entered the workshop.

The fragrances of half a dozen woods. Raw materials neatly stacked on open shelves. Machines lined up along the wall. Lucky Luke selected a discarded bit of maple end stock from a bin, chucked it up in the lathe. He chose a chisel from the rack, the one Luke—he—favored for rough cutting. He spun the flywheel, began pumping the lathe up to speed.

Working the treadle was trickier than he expected, but he eventually got the knack. He set the chisel, advanced it. And jammed it against the wood. *Let's start over.* Another twenty minutes of practice and he was doing a decent job of shaping a small table leg. His small motor skills were starting to catch up with his rich store of knowledge.

"I thought you were on leave of absence." Elwen stood near the door, her arms folded across her chest. *How long has she been watching?*

"Just thought I'd get some practice."

She advanced upon him slowly, eyed the tailings beneath the lathe. A few irregular chunks still showed.

"Looks like you need it," critically. Her face was neutral. The lathe slowed, stopped. Neither moved.

Lucky Luke wanted to touch her, she was standing so close. But all he could muster was a sidelong appraisal. Her hair was stringy, her complexion pasty, bags under her eyes. She stank of stale

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sweat and the musky liquors of childbirth. She was beautiful.

"How's Kandra?" was all he could say.

"Exhausted. So's her daughter. But they're both alive and recovering, thanks less to me than to good fortune." Was there an extra emphasis on that last word? She continued her inspection tour with arms folded, walked slowly around his back to eye his work from the other side.

"And how did your trip turn out?" Still neutral. Still not looking him in the eye.

"We found the gateway. We made it through the storm. We learned a surprising thing or two about how much we have in common." He dared a glance at her. She met it obliquely. "We also learned that we can't stay in the same world together for very long."

A considering nod. "And I guess you picked up that slight accent from a couple of days of chatting in English? You sound almost like your mother."

Lucky Luke knew better than to answer. He felt a growing ache in the region of his heart.

She wheeled on him, finally meeting his gaze directly. "So tell me, how did you decide who went down which hill? Did you weigh the pros and cons? Flip a coin?" Those astonishing gray-green eyes flashed with anger. And hurt. "Tell me, how did *you* get to end up here, with me, and *he* in that other world?"

He regarded her sadly. *So near and yet so far.* Half defeated, half defiant, "I don't know. Just call me Lucky, I suppose."

The anger evaporated, but not the hurt. Before she could say anything more, he dug out the letter he had been carrying. It was written on several small sheets torn from his field notebook.

She accepted it, almost reluctantly, unfolded it and read it quickly. Then again, more slowly. Then again, more slowly still.

"Do you know what this says?"

"No. He managed to keep it from me, though I still don't know how. But I can guess. I'm sorry. He really wanted to see my world, and I really needed to come here."

He waited while she contemplated the letter. Slowly the tears came, fell. He wanted so badly to console her, risked touching her shoulder. She stiffened. He immediately withdrew his hand, trying not to feel hurt.

"I should have known he'd do something like this." She stuffed the letter in a dress pocket, wiped at her eyes in anger and frustration. "He's so damned irresponsible."

"In fairness to him, he did risk his life to save mine. And he's taken on some real challenges for me in my world, ones I'm not as well equipped to face." He met her eye. "He's grown a lot in the past couple of days. We both have. And we're both really sorry that we've hurt you."

"And so you get the girl now, is that how it works?" Her arms were folded across her chest again.

"That's how I'd like it to work, yes. But I'm not taking anything for granted. I've known you for years, Elwen. I know the wonderful little girl who is sometimes shy, sometimes curious, sometimes playful. The girl who wants so bad to be loved, and is willing to be loving and loyal and sacrificing in return. I've been in love with that girl for most of my life."

She looked briefly . . . vulnerable. His heart skipped a beat. But then her anger welled up again.

"Well, that puts you at an advantage, doesn't it? Because I don't know you. You may look like Luke, but you're still Lucky. And we both know it."

He smiled gently. "Actually, I'm Lucky Luke now, and so is he. Over time, I hope you'll come to understand what that means. Two days ago, for example, I couldn't have talked to you like this. Now I can even hope that you'll give me a chance."

She studied him for a long moment, shrugged, and essayed a sad smile.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Well, Lucky Luke, welcome to my world. That's the best I can do for now. So where do we go from here?"

"I'd suggest a shower and a nap. We're both grimy and exhausted. You can have the bed, and take the first shower. You need both more than I."

"You're pretty ripe yourself. And it's your bed, whatever 'your' means in this bizarre situation. You can go first." She cocked her head. "Or perhaps you'd like to share a shower and a bed with me?"

"I'd like nothing more, but not right now. Your heart's not in it. It would be too painful."

She relaxed perceptibly. He knew he had passed her first test, the first of many. "You're right, of course. I'll let you pamper me this time. Come on."

A few miles away, and a couple of universes over, the other Lucky Luke stirred in his sleeping bag. He awoke with a smile. *Well, that's a start.*

The morning was chill, but pleasant. The last of the storm had dissipated with the closing of the gateway. He could survive with relative ease until he headed down the mountain Monday morning. But the novelty of granola bars had already worn thin.

He was still a bit apprehensive about what he had taken on. Soon he would plunge into the complexities of high finance and legal maneuvering, concepts alien to his bucolic upbringing. They might question his slight accent, or notice his oddball assortment of missing skills. But he was well armed with the proper memories, fingerprints, and DNA. And a complete absence of traces of phenobarbitol in his bloodstream. *That'll knock 'em off balance.*

He was looking forward to his New Year's Eve pub crawl with Deanna. And his visit to Ithaca. And a lightweight semester of college courses to help him get up to speed. By the time he and his doppelganger got together at the summer solstice, both would have many new experiences. And still a lifetime to explore new worlds.

But first, he had some major debts to pay down. These two were on their way to a happy life together, but their immediate future was particularly perilous. They would have to get through some serious fighting and crying to reach the laughter and passion both were so eager to share. A little extra luck could help keep them together through the bad spots. He scrunched deeper into the sleeping bag, pulled the flap over his forehead for added warmth.

Then Lucky Luke went into the Weaving. He knew it would alter him to his very foundations, even as he altered the others in lesser ways, but he also knew the cost would be easily borne. Without qualm or hesitation he fiddled probabilities, for the highest of goals.

If self awareness be miraculous, then awareness of another self transcends all miracles. If a willingness to sacrifice for the good of another be admirable, then a mutual willingness transcends all admiration. In a lonely Universe circumscribed by mortality, lifelong companionship is almost too much to hope for.

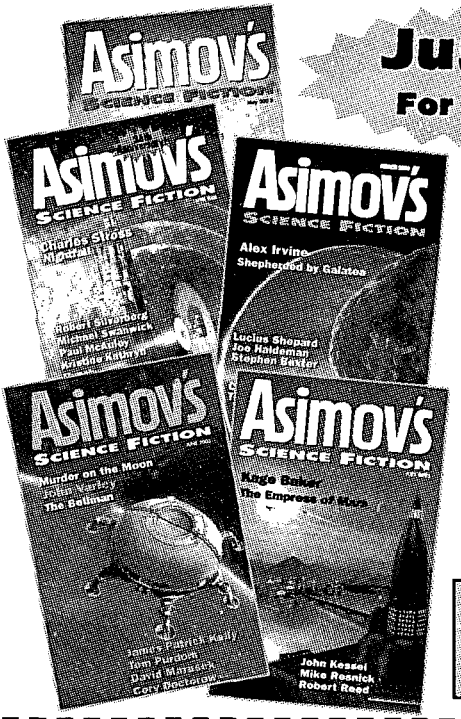
But Lucky Luke went into the Weaving. Willingly, happily, he would Weave inseparably the fortunes of the two souls he held nearest and dearest. So Lucky Luke went into the Weaving, the Weaving of love. ■

Luck's a chance, but trouble's sure.

—A. E. Housman

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

DISCOUNT TIME TRAVEL



Just $6.95!
For 5 Classic Issues

Order our **Asimov's Science Fiction Value Pack** and you'll get 5 of our most popular back issues for just $6.95 plus shipping and handling. **That's 65% off the regular price!**

Enjoy novellas and short stories from the leading science fiction and fantasy writers. Plus, candid, no-holds-barred book reviews and guest editorials.

To order,
just fill out the coupon below and mail with your payment today.

DELL MAGAZINES
Suite SM-100, 6 Prowitt Street, Norwalk, CT 06855-1220

☑ **YES!** Please send me my **Asimov's Science Fiction Value Pack**. I get 5 back issues for just $6.95 plus $2 shipping and handling ($8.95 per pack, U.S. funds). **My satisfaction is fully guaranteed!** My payment of $_____ is enclosed. (IAPK05)

Name: _____
(Please print)

Address: _____

City: _____

State: _____ **ZIP:** _____

Please make checks payable to Dell Magazines Direct. Allow 8 weeks for delivery. Magazines are back issues shipped together in one package. To keep prices low we cannot make custom orders. **CT Residents**: Please add 6% sales tax to your total order. Add $4 additional shipping and handling for delivery outside the U.S.A. Offer expires 12/31/04. 93C-NN5VL1

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

SCIENCE FACT

IF A TREE FALLS . . . OR THE SECRET HISTORY OF GLOBAL ENVIRONMENTAL CATASTROPHE

Catherine H. Shaffer

The Dark Ages

Human history is a mosaic of economics, scientific progress, individual initiative, and random chance. The world goes to war because one man is assassinated. Kingdoms change hands because someone invented a longer spear or a faster arrow. But the environment has long been overlooked as an influence on history. Human interaction with the environment, instead, has been the domain of anthropologists studying hunter-gatherers. Now new answers to an old mystery hint that the environment not only plays a role in our history, but that it is a crucial role.

Most of us learned in school that the Dark Ages began in the vacuum left by the Roman empire, whose fall resulted from over-reaching ambition, corruption, and human frailty. Comparatively few records remain from that time, especially from the sixth-century, which is considered both the low point and the official beginning of the Dark Ages.

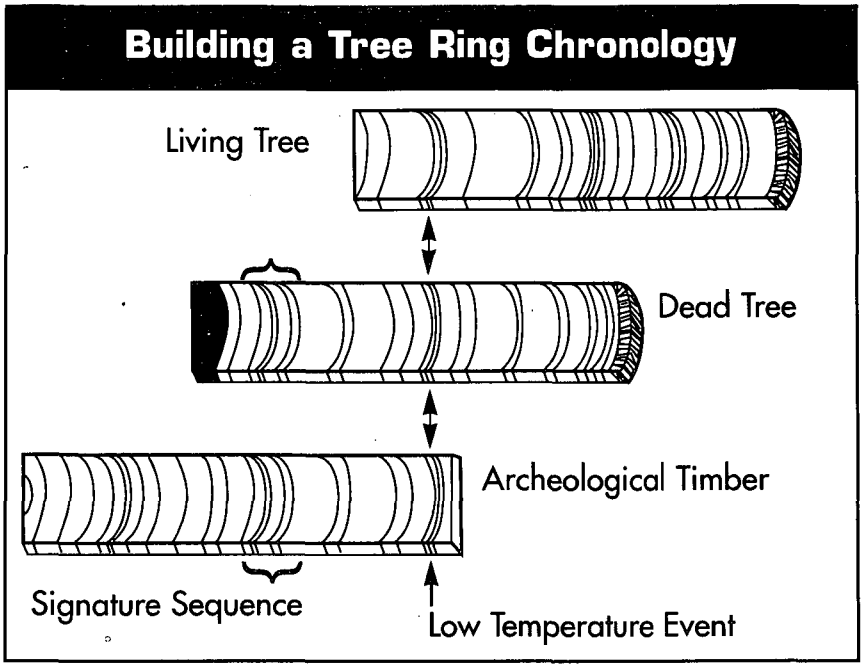
It's not until recently that scholars have begun to think something very unusual happened around that time, that perhaps the apocalyptic writings of sixth century historians are pointing to something more concrete than political and economic hardship. Their most important clue came not from musty old libraries, but from the forests.

We Speak for the Trees

Trees live a very long time, their memories are accurate, and they hold a grudge forever. Deprive them of good sunlight for a season and they'll complain about it hundreds of years later. And the trees, it turns out, have much to complain about.

Andrew Douglass, an astronomer, pioneered the science of *dendrochronology*. He was trying to pin down cyclic variations in solar output in Arizona in the 1920s. Assuming that Arizona received equal days of sunshine each year,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Douglass identified two sources of variation in the size of annual growth rings in pine trees: yearly rainfall and ten-year-long solar cycles. (We now know these as eleven-year sun spot cycles, but, by chance, Douglass made his observation at a time when the cycles were shorter.) He began constructing a chronology of Arizona pine tree rings back to the year 1700. Then he stretched it further using timbers and other pieces of wood from archeological sites. By repetition and overlap with older trees, Douglass was able to build a continuous record to AD 1284.

Trees respond to anomalous growth conditions in different ways, depending on their region and their species. A cold year, or one that's poor in rainfall, might yield a noticeably narrow ring, or even a microscopic one. A year with a hard, early frost after a relatively normal summer would have rings of normal size, but with damage at the cellular level. Some trees, which thrive in cold conditions, might have an unusually wide, robust growth ring in a year thought to be a nearly total loss by other species of trees. And in a spectacularly bad year, many trees will skip a ring altogether, and not have a growth ring at all, even at the microscopic level.

Patterns of good and bad years in trees are distinctive, and unique sequences, called *signature sequences* by Andrew Douglass, are what makes it possible to match ring patterns in different trees. These patterns of highs and lows hint at what the growing conditions were like for a particular tree in a particular region.

Although of interest originally to astronomers, dendrochronology became popular with archeologists. Other trees began giving up their secrets, always reaching further into the past. The giant sequoia of California, which can live two thousand years, yielded information on prehistoric droughts and fires. And in the 1950s, Edmund Schulman began to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CAIRO—HALF A MILLION PEOPLE WERE KILLED INSTANTLY TODAY IN THE AEGEAN SEA BY THE ERUPTION OF THE VOLCANO SANTORINI ON THE ISLAND OF THERA. THIS DISASTER FOLLOWS A MONTH-LONG BOMBARDMENT OF THE EGYPT AND SURROUNDING COUNTRIES WITH FIRE AND BRIMSTONE. HEBREW REFUGEES SAY THEY'VE HAD ENOUGH. THEY BLAME THE CATASTROPHE ON THE EGYPTIAN PHARAOH AND WARN THAT IF WE ALL DON'T CHANGE OUR WAYS, THE WORLD WILL COME TO AN END. JEWISH SCHOLARS WILL ANNOUNCE THEIR FINDINGS ALONG WITH A LIST OF POLICY CHANGES FOR IMPROVEMENT IN HUMAN BEHAVIOR, "THE TEN RECOMMENDATIONS," AT A MEETING TO COMMENCE FORTY DAYS HENCE IN THE SINAI PENINSULA. ONE RABBI, WHO DECLINED TO GIVE HIS NAME, SPOKE ABOUT THE RECOMMENDATIONS, "I'M NOT ALLOWED TO TELL YOU MUCH, BUT I CAN SAY THIS: THERE'S NOT GOING TO BE ANY MORE KILLING. WE'RE VERY EXCITED ABOUT THIS. WE THINK IT WILL BE A VERY POSITIVE DIRECTION FOR HUMANITY. WE WANT TO GET EVERYONE INVOLVED. IT'S LIKE, "IF YOU'RE NOT PART OF THE SOLUTION, YOU'RE PART OF THE PROBLEM."

study the world's longest-lived tree, the bristlecone pine. Found in the Nevada mountains, the bristlecone pine is a stunted specimen looking more like a piece of standing driftwood than a living organism, but it can live five thousand years! The sum data from living and dead bristlecone pines provides scientists with an eight-thousand-year-long record of regional weather conditions.

European scientists had no such long-lived trees to work with. Instead, Germany's Bruno Huber in 1930 embarked on a grueling 30-year mission to construct an oak chronology. Oaks live only a few hundred years, but Huber had access to a rich supply of historical buildings made with oak timbers. Once again, by overlapping the dead timbers with living trees, and then laying over these even older timbers, a one-thousand-year record was constructed.

Dendrochronologists chart the ring sizes, then compare the charts, correlating distinctive patterns. Andrew Douglass was so adept that he could date a piece of wood without referencing his charts, by eyeballing the signature sequences. But a chronology constructed with thousands of trees, such as Huber's oak chronology, can overwhelm even the most knowledgeable scientist. In the 1960s, computers accelerated the process, stretching the German oak chronologies back to nine thousand years ago by running correlation programs on data from thousands of trees, and checking the similarity of patterns at every possible point of overlap. Using Huber's manual methods, it would have taken another two hundred forty years to complete this chronology!

Other scientists, working independently in Ireland and England, were able to build their own chronologies based on oaks which synchronized perfectly with the German oaks back to the exact year 5000 BC.

Thus, current tree ring records are replicated at three levels. First, there is replication between multiple trees at one site. The second level is replication between sites. And the third level of replication is between chronologies constructed by different workers. The margin of error is zero years. This redundancy in the tree records is so complete, and the record is so accurate, that it has become the standard against which radiocarbon dates are calibrated.

As a source of environmental information, tree ring chronologies have also correlated highly with other records. For example, the European oak master chronology contains a dramatic growth reduction event in AD 1740-1741. This coincides with a temperature reduction recorded in Manley's Central England temperature record, which extends all the way back to AD 1659. A hard freeze

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

set in in 1739, precipitating a famine and the death of three hundred thousand people in Ireland. Observers in England and Ireland recorded unprecedented cold that winter, with water freezing in mid-air as it was poured into a glass, and Ireland's Lough Neagh frozen across its twenty mile surface. The Irish bog oak chronology independently identified 1739 as an extraordinarily cold year.

Years Without Summer

Occasionally environmental conditions are so stupendously bad that it's noticed by trees all over the world. As these very long, and very broad master chronologies evolved, certain dates in history began to stand out as being distinctly unusual. As described in *Exodus to Arthur: Catastrophic Encounters with Comets*, by Mike Baillie, those dates are: 3195 BC, 2354 BC, 1628 BC, 1159 BC, 207 BC, 44 BC, and 540 AD.

Of these seven dates, 540 AD stands out as the most accessible, the best documented, and the most severe. The episode had a double minimum, beginning in 536 AD and plunging further yet to another event piggybacked on at 540 AD. Until recently, historians had little notion that this dramatic climatic event had occurred. The accounts left by contemporary observers were poorly understood and overshadowed by later historical events. In fact, those later events, it turns out, may have been caused, directly or indirectly, by the weather of AD 536.

The Praetorian Prefect Magnus Aurelius Cassiodorus Senator wrote a letter documenting the conditions. "All of us are observing, as it were, a blue-coloured sun; we marvel at bodies which cast no mid-day shadow, and at that strength of intensest heat reaching extreme and dull tepidity . . . So we have had a winter without storms, spring without mildness, summer without heat . . . The seasons have changed by failing to change; and what used to be achieved by mingled rains cannot be gained from dryness only."

Another historian, Procopius of Caesarea, a Byzantine, wrote, "And it came about during this year that a most dread portent took place. For the sun gave forth its light without brightness, like the moon, during the whole year, and it seemed exceedingly like the sun in eclipse, for the beams it shed were not clear nor such as it is accustomed to shed."

John of Ephesus, a cleric and a historian, wrote, "The sun was dark and its darkness lasted for eighteen months; each day it shone for about four hours; and still this light was only a feeble shadow . . . the fruits did not ripen and the wine tasted like sour grapes."

In the wake of this inexplicable darkness, crops failed and famine struck. Out of Africa, a new disease swept across the entire continent of Eurasia: bubonic plague. It ravaged Europe over the course of the next century, reducing the population of the Roman empire by a third, killing four-fifths of the citizens of Constantinople, reaching as far East as China and as far Northwest as Great Britain. John of Ephesus documented the plague's progress in AD 541-542 in Constantinople, where city officials gave up trying to count the dead after two hundred thirty thousand: "The city stank with corpses as there were neither litters nor diggers, and corpses were heaped up in the streets . . . It might happen that [a person] went out to market to buy necessities and while he was standing and talking or counting his change, suddenly the end would overcome the buyer here and the seller there, the merchandise remaining in the middle with the payment for it, without there being either buyer or seller to pick it up."

Taken in the context of hard scientific evidence for a climatic event in AD 536 (and after), these accounts sound utterly clear and unambiguous. Three men, in three different locations, are record-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CAMELOT—A REWARD HAS BEEN POSTED FOR ANY INFORMATION ON THE WHEREABOUTS OF THE HOLY GRAIL. THE GRAIL, A GLOWING OBJECT OF MYSTICAL IMPORTANCE FALLEN FROM THE SKY, IS SOUGHT AS A MEDICINAL TREATMENT FOR ARTHUR, KING OF THE BRITONS. KING ARTHUR SUFFERS FROM FATIGUE, IMPOTENCE, AND A DIRE CASE OF THE WINDS. THE KING'S AILMENTS AFFLICT THE KINGDOM AS WELL, AS FOR THE SECOND YEAR IN A ROW, CROPS FAIL AND THE NOON SUN CASTS NO SHADOW. MANY COUNTIES TO THE WEST OF CAMELOT ARE COMPLETELY UNINHABITABLE DUE TO THE POISONOUS GASES WHICH REEK UP OUT OF THE EARTH AND STRIKE DEAD ANY ANIMAL THAT BREATHES THEM. ARTHUR ANNOUNCED MONDAY THAT HIS KNIGHTS OF THE ROUND TABLE WILL QUEST FOR THE GRAIL WITHOUT CEASING UNTIL IT IS FOUND. AS A SIGN OF HIS COMMITMENT, HE WILL LEAD THE EXPEDITION PERSONALLY. AND THERE WAS MUCH REJOICING.

ing environmental phenomena such as dry fog, darkness, cold, drought, and famine. And the records are in no way limited to these writers, nor even to these regions.

The question remains, then, why is it so little known in our own time? A partial answer lies in looking at these historical writings from a regional perspective, since history is generally studied one nation, empire, or continent at a time, rather than in cross section across the entire planet. Additionally, without a scientific explanation for the phenomenon, the imagination fails. What could cause eighteen months of darkness? It's much easier to believe that Cassiodorus Senator, Procopius, John of Ephesus, and the others were indulging in hyperbole, and possibly even speaking metaphorically, than to face the challenge of solving such a mystery, and possibly exposing oneself to ridicule.

Lastly, our society has a certain myopia regarding climate changes. Human beings are not good at understanding worldwide weather patterns on a geologic time scale, and tend to assume that the weather we experience during our lifetimes is the weather that is completely normal for the planet at all times. And when climate change does occur, we are only too happy to take the credit for it (or the blame). It is uncomfortable and uncharacteristic for human beings to accept that something beyond our control could take away the seasons, the rain, and the Sun. Thus, even in the face of incontrovertible evidence that *something* happened in AD 536, and the fact that we have had this information in our libraries for the past millennium and a half, we still don't know about it. We deny it.

Whodunit

Having established that an event definitely did occur in AD 536, it remains to determine what type of event it was. The first theory, proposed by Val LaMarche and Tom Harlan, based on the testimony of California bristlecone pines, was that the periodic temperature minimums recorded by tree rings were caused by volcanic eruptions. A sufficiently large volcanic eruption could theoretically inject debris into the stratosphere, spreading it across the globe. The resulting "veil," composed of dust, droplets of sulfuric acid, and ice crystals, could have caused the effects noted by Senator, Procopius, and John of Ephesus. The magnitude of the eruption would have to be stupendous—much greater than Krakatoa or Pinatubo or any other eruption recorded in modern times. The presence of frost rings in the bristlecone pines, indicating a normal growing season interrupted by a sudden hard frost, supports this hypothesis.

One of the most reliable sources of information about prehistoric volcanic eruptions lies in the ice layers of Greenland. Ice forms layers corresponding to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

calendar years that can be read in much the same way as tree rings, by means of cores drilled deep into the ice. Volcanic eruptions exist in the ice layers as sulfuric acid. Unfortunately, an ice core chronology is much less accurate than a tree ring chronology, and not subject to replication in the same way as tree rings.

Candidates for ancient volcanoes sufficient to shut down sunlight worldwide are scarce. One such was Santorini, a volcano that blew apart a sizable island in the Aegean. Ice cores showed a significant acid layer at 1390 +/- 50 BC that was tantalizingly close to the accepted date of *c.* 1500 BC for the Santorini eruption given by Egyptologists. Unfortunately, dendrochronologists had pinned 1628 BC *exactly* as the target date for the Santorini eruption. This debate raged for several years until 1987, when new data showing an acid layer at 1645 +/- 20 BC was published. However, this new information led not to consensus, but more debate, as the ice core camp refused to acknowledge that their date was the same as the dendrochronologists' 1628 BC date and the Egyptologists refused to consider variations from their accepted historical chronologies.

However, much of this argument is being challenged by a new theory of global catastrophe: extraterrestrial impact. The volcano hypothesis was never watertight. Vulcanologists cannot accurately date their eruptions, and even if they could, some scientists doubt that a volcano could cause such persistent global climate changes. And finally, there is no sulfuric acid layer in the Greenland ice cores for AD 536.

Near-Earth Objects

In 1984, Irish dendrochronologist and paleoecologist Mike Baillie proposed that the climatic event of AD 536 (and by extension, all six of the others) could have been caused by "an asteroid, a comet, cometary fragment(s), or cosmic swarms."

An asteroid is a rock in space. They occasionally enter Earth's atmosphere, leaving a fiery trail behind them, and become "shooting stars." Comets contain ice, and thus are sometimes called "dirty snowballs." They are thought to originate from outside the solar system, and when they approach the warmth of the Sun, the ice melts and forms an atmosphere, which gives rise to the comet's tail. Asteroids are much more common than comets.

Baillie backs up his theory with the work of astrophysicists such as Victor Clube and Duncan Steel. According to them, odd impacts by extraterrestrial objects happen fairly frequently, and we should have been hit by a fairly large object, or a swarm of smaller ones, in the last five thousand years.

Small extraterrestrial impacts occur frequently. NASA classifies Near-Earth Objects (NEOs) as "small bodies in the solar system (asteroids and short-period comets) with orbits that regularly bring them close to the Earth and which, therefore, are capable someday of striking our planet." Millions exist between 0.1 km and 1 km in diameter. There are five hundred million between 10 and 100 m. Each year there is on average one impact with an object up to 6 m in size, giving rise to a 15-kiloton explosion. The estimated minimum global catastrophe threshold is 1 km in diameter. One thousand 1-km NEOs exist.

Baillie's proposal has been greeted with skepticism by historians. In *Exodus to Arthur*, he writes, "The ideas of catastrophism and environmental determinism have been so thoroughly marginalized that it is almost impossible to have an informed conversation on the topic of bombardment from space. Yet astrophysicists make a very plausible case that the Earth should have been affected during the last few millennia . . . Even more bizarre, those same dismissive archaeologists and historians, asked if there have been collapses of civilizations or population movements in recent millennia, will happily answer in the affir-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

mative. In the great whodunit of history, astrophysicists have the 'gun' and archaeologists/historians have the 'corpse,' but no one suspects a 'shooting.'"

This new information demands a new perspective on history. If we accept that the Earth has been bombarded many times in the history of civilization, resulting in a worldwide "nuclear" winter, plague, famine, loss of population, and the collapse of civilizations, two new questions surface. First, except in the case of 536 AD, none of these events are directly recorded. What sorts of indirect accounts and oral histories survive to tell us of these great apocalypses? And second, how does a global catastrophe shape history?

The Ark, Exodus, and Camelot

Answering the first question requires a reexamination of the 1628 BC "Santorini eruption" event. In *Exodus to Arthur*, Mike Baillie postulates a link to the biblical Exodus. Many biblical passages lend themselves to a catastrophic interpretation. The Israelites followed a "pillar of cloud by day and fire by night," which could have literally been Santorini as seen from Egypt. However, other biblical phenomena don't fit as neatly with the volcano theory. Could it instead have been a cometary impact, or a close pass of a comet, resulting in earthquakes, volcanic eruptions, and tsunami as secondary effects? Again, in light of the date discrepancies (biblical scholars place the Exodus in the thirteenth century BC) it seems outrageous to suggest that the whole thing happened four centuries earlier and that it was really caused by a comet. But if one accepts that something extraordinary happened in 1628 BC, something noticed by trees all over the world, then it's *not* such a stretch to think it might have been recorded in the story of the Exodus. From the point of view of the Hebrews of the seventeenth century BC, it must have seemed like the world was actually ending. They had to have remembered it *somehow*.

In addition to the Exodus story, Mike Baillie has forged a tenuous link between the 2354 BC event and the biblical Flood. Based on observations of the atmospheric explosion of a relatively small (about 40 m across) object above Tunguska in Siberia in 1908, Baillie speculates that a much larger impact could have caused worldwide inundations and/or tsunami. A detail too tantalizing not to mention is that Bishop Usher (best known for calculating the age of the Earth based on the Bible) dated the biblical Flood to 2349 BC. Usher's chronologies are now disfavored, and there may never be a way to definitively link the Flood story with a comet event, but it's fascinating all the same.

Another well-known mythology that bears a catastrophic interpretation is the story of King Arthur. Although scholars place the historical King Arthur in the fifth century, the date of his death is given as AD 539. Furthermore, much of the imagery from the Arthurian legend fits with the appearance of a comet and subsequent famine and plague—the "Waste Land" of so much legend. Ireland's St. Patrick stories feature a wasteland as well. And although St. Patrick is credited with chasing the snakes out of Ireland, it's worthwhile to consider that there never were snakes in Ireland, and that snakes and dragons are common images associated with comets.

536 AD—the Aftermath

Until the sixth century, the Britons had held control of post-Roman Britain, keeping the Anglo-Saxons isolated and suppressed. In the wake left by the Roman empire, the Britons maintained the status quo, living in towns, with elected officials, and carrying on trade with the empire. After AD 536, the Britons all but disappeared, and were replaced by Anglo-Saxons. It's a matter of debate whether the Anglo-Saxons killed all of the Britons, or assimilated them. But a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

competing theory is that the bubonic plague that afflicted the Roman empire wiped them out, and that the Anglo-Saxons enjoyed relative immunity due to their barbaric lack of trade or other contact with the civilized world.

Elsewhere, or possibly everywhere, the sixth century proved to be a watershed. David Keys, archeologist and author of *Catastrophe: An Investigation into the Origins of the Modern World*, explains that the plague originated in East Africa, where it existed in fleas which lived on the plague-resistant gerbil. When drought (caused by a dust-laden atmosphere) killed off the larger predators, the gerbil was free to expand its range, spreading its plague-infested fleas to the multimammate mouse, who gave them to the ratlike *Arvicanthus*, who gave them to *Rattus rattus*, a worldly, sophisticated rodent who visited all of the popular ports of call, carrying the plague fleas with it.

Meanwhile, on the steppes of Asia, which would not be visited by plague until much later, the climate event of AD 536 caused a political upheaval. Because of the drought, the horse-based economy of the warlike Avars foundered, and their vassals, the cattle-herding Turks, overthrew them. Evicted from their home on the steppes, the Avars loaded up their tents and marched off, looking for greener pastures. They ended up in Hungary, and in cahoots with the Slavs, began to chip away at the borders of the Roman empire.

And in Yemen, in the 540s, a dam broke. By 550 AD, the great Marib Dam, an engineering marvel of the ancient world, was a complete loss and thousands of people migrated to another oasis on the Arabian peninsula, Medina. The Arab people, weakened by famine, begin to rouse themselves and think of conquest. In 610 AD, a new leader united them—Muhammad.

Although all of the *interesting* historical changes happened in the seventh century—the Roman war with Persia, the rise of Islam, rebellion and civil war in the Roman empire, and the advance of the Slavs driven by the Avars—all can be legitimately traced to the environmental catastrophe of 536 AD.

The End is Near

These effects in history's most recent, best documented global catastrophe have implications for all of human history. There is a theory in evolutionary biology called *punctuated equilibrium* which explains how a species could exist quite stably in the fossil record, and then suddenly be replaced by another. First proposed by Niles Eldredge and Steven Jay Gould, the controversial theory has come to gain wide acceptance. Evolution, it states, is not a slow, gradual, continuous process, but an uneven one. Long periods of little or no change are punctuated by periods of rapid, dramatic change. The fast changes are most likely triggered by extinction events, with new species expanding to fill the vacuum. The most famous example of this process is the extinction of the dinosaurs (caused by an asteroid) and the subsequent rise of mammals.

If evolution on Earth can be punctuated by encounters with large comets or asteroids, could human history be punctuated by smaller ones? In each of the examples of tree ring events, new levels of political organization and new religions arose in the wake of the disaster. Could much of our prehistory be similarly driven by the trauma of near-destruction? The development of agriculture? The migration across the Bering land bridge? Could a comet be the missing element in the demise of the Neanderthals?

A larger and even more pressing question is *what does this mean for the future*? Some experts, among them David Keys, continue to argue for the volcano theory, postulating a gigantic eruption in 535 AD near Sumatra. According to Keys, another mega-eruption could be imminent, originating from any of a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

number of seething monster calderas, primarily at Yellowstone, Long Valley (California), Naples, or Papua New Guinea.

Advocates of the comet theory have a similar message, though less specific. There is no way to predict when the next object will strike the Earth. NASA and the US Air Force have initiated programs to search for and track near-earth objects. NASA's Spaceguard program aims to find 90% of NEOs larger than 1 km (global catastrophe threshold) within the decade. None of the currently identified NEOs poses an impact risk to the Earth. However, it is estimated that less than half of the larger ones are identified, so a major impact could occur any time without warning.

An impact (or an eruption) on the scale of the AD 536 event would likely cause a similar or greater level of worldwide chaos. Our politicians are no more immune to ouster by an angry and capricious populace than the Romans'; and with our substantially larger world population we are, if anything, even more vulnerable to drought and crop failure. Bubonic plague still resides in isolated reservoirs, waiting for a chance to gallop across the globe.

An even greater concern is a much larger extraterrestrial impact, of the class that destroyed the dinosaurs. It is unlikely that humanity could survive contact with some of the larger NEOs, and even more unlikely that we could defend ourselves even if we had advance notice of such a catastrophe. Colonization of other planets is one option for keeping the species alive, but the best one, it seems, is no different than in ancient times, when people responded to disaster by aspiring to greater organization and more righteous behavior to avoid angering the deities, which is to say that at this time there is no practical, scientific solution to this problem. ■

References

Baillie, M. (1999). *Exodus to Arthur: Catastrophic Encounters with Comets*. London: B. T. Batsford Ltd.

Gunn, J.D. (2000). *The Years Without Summer: Tracing AD 536 and its Aftermath*. Oxford: Archeopress.

Keys, D. (1999). *Catastrophe: an Investigation into the Origins of the Modern World*. New York: Ballantine Books.

NASA Ames Research Center (2002). *Asteroid and Comet Impact Hazards*. http://impact.arc.nasa.gov/

Special thanks are due to Mike Baillie

About the Author

Catherine H. Shaffer, a descendent of Hungarians, Slavs, *and* Anglo-Saxons, lives and writes in the Detroit area. She has held the usual assortment of writers' odd jobs, including stable hand, veterinary assistant, molecular biologist, cashier, landlady and full-time mother. She has published several non-fiction articles and one short story. She enjoys running and swimming and has recently taken up the violin.

Our life is but a new form of the way men have lived from the beginning.

—Henry Ward Beecher

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

FACES

Charles L. Harness

Can a person know too much?

Prologue

Jennifer Martin stands on her balcony, looking out over the city. She points. *I know you. And you. And you. I know every one of you. But me—who am* I?

The phone rings. She walks back into her apartment and picks it up. "Yes?"

"The judge is on his way."

"Coming."

She and the two other officers arose from the table as the judge entered. Agent Casimer Collins made the introductions: "Agent Martin, and Agent Fann." The newcomer nodded and studied the woman briefly as he took the offered seat. "Your Honor," said Agent Collins, "shall I take it from here?"

"Your show, Mr. Collins, go ahead."

"Okay, I'll start at the very beginning. There are only two known sources of smallpox virus—our repository in Atlanta and the Vector laboratory outside Novosibirsk, Russia. We know that a former Vector scientist left Russia three months ago, was noted briefly in Iraq, then disappeared. We have intelligence reports that three vials of smallpox simultaneously disappeared from Vector.

"The CIA and we at the FBI have followed those three vials through Pakistan, Iraq, Syria. We lost them for a while, but they surfaced once more in Marseilles, and we were able to follow them into this country. We think they are now hidden in an apartment in this city. There are eight apartments in the suspect building. We have questioned each tenant separately, with Agent Martin watching. Using a technique known as the 'Facial Action Coding System'—'F.A.C.S.'—she identified one of the eight as a likely suspect. He calls himself Simon Drake. His Moroccan birth certificate gives Abu Tarif. He entered this country as a young man and is actually naturalized.

"Our next step would be to search Drake's apartment. Accordingly, I asked you, Judge, to issue a routine search warrant, based on information provided by Agent Martin. That information was simply this—she read the suspect's face, and by that reading she understood that Drake was hiding something deadly, probably in his apartment. Smallpox, we suspect. You, Judge, have refused to sign the warrant. You say you are not convinced that F.A.C.S. states a lawful ground for a search, but you are here to see if we can convince you otherwise. Am I right so far?"

"Yes, Mr. Collins, that about sums it up. I remind you, your application for a search warrant is supposed to be a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sworn affidavit stating supporting facts. You cite F.A.C.S.—which simply says, this guy had a guilty look. You want me to issue a search warrant on a guilty look? My colleagues would laugh at me."

Agent Collins nodded gravely. "We certainly would not want that to happen. That's why—"

The judge broke in. "You know, Mr. Collins, we have the Fourth Amendment: no unreasonable searches and seizures. And to enforce it, we have Title 18, Section 2235 of the Federal Criminal Code, which says if without probable cause you procure a search warrant, you will be fined or imprisoned. And I'll be in the next cell. So we ask, *do we have probable cause?*"

"Your Honor, we—"

"Actually, Mr. Collins, I should mention that I've checked into the reported cases. There's quite a mix there. We have the obvious, technically supported grounds: fingerprints, DNA, tire treads, shoe impressions. All good for a warrant. And then the subjective grounds, some allowed, some not: alleged identifications by bloodhound, cologne odor, voice, footsteps. So now you say, F.A.C.S. No precedent cases. Nothing to guide us. Nothing for, nothing against. Am I to be the first? Well, enough of that. Back to basics. Explain to me: how would Drake use the cultures? What's the danger?"

"Yes. Well, take a sample scenario. A maintenance worker showing the proper badge enters the mall with a can of plant sprayer. He goes about his business. It takes less than thirty minutes to empty the sprayer. He then disappears. He leaves a mist of virus particles in the one-to-five micron range, the size that hangs in the air for hours. If you inhale a single particle, you can come down with the disease. And that's just the beginning." He gave the judge a questioning look.

"Go on."

"Okay. Once you've got it, you spread it simply by talking. Tiny droplets of saliva, too small to be seen, surround you in a droplet cloud, diffusing ten feet in all directions. The particle lands on the mucous membrane in someone's throat, it enters a cell, and begins to make copies of itself. It spreads and incubates in that body for one to three weeks. It may take two weeks after exposure before doctors can definitely diagnose smallpox. Death occurs early, and by a variety of mechanisms—toxemia, shock, intravascular coagulation, heart attack. Meanwhile, it spreads in ever-widening circles." He looked at the judge. "More?"

"Very interesting. Sure, go ahead."

"Okay. Well, the mall technique is overkill, of course. A single case anywhere would be considered a global medical emergency. Each infected person infects an average of ten to twenty more people. By the time the host feels sick, the virus has moved on to its next victims. Ten days later, thirty cases would be reported. And then there are the isolated traveling cases, in an expanding area that soon includes the entire eastern seaboard. Then the continent. Both continents. Air travel spreads it throughout the world. Before it's over, one-third of the global population is dead and maybe the rest wish they were."

"Sounds pretty bad."

"Bad, yes, but not hopeless. There's vaccination. Vaccines are not here yet, but they're surely coming. Vaccination as late as four or five days after exposure may prevent death. A person's immunity begins to grow immediately after the vaccination and it takes full effect within a week. And we have drugs. Cidofovir can block smallpox replication in vitro, but it's complicated. And it has never been used to treat an ongoing case of the disease. It has to be given by IV drip, and there's risk of kidney damage. And then there's immunoglobulin—'VIG'—which contains antibodies to the virus. It works if given the first week after exposure, especially with concurrent vac-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

cination."

"Hm. Interesting. Does he know he's being watched?"

"Not sure. In any case, if he starts anything, it isn't likely he'll take an active part. As a matter of caution he'll probably pass the culture to someone else for distribution. We don't think he's done that yet. We need to find it before he acts. We need to search his apartment."

"Hm. Well . . ."

"Judge, we stand ready to prove that F.A.C.S. is sound basis for a warrant."

A Game of Poker

"With a game of *poker?* "

"Well, yes sir."

"You're aware, Agent Collins, I won the Amateur Poker Tournament in Las Vegas seven years ago?"

"Yes, sir, and we know you do well in friendly games in the judicial fraternity. But I think you'll find Agent Martin is even better. She joins our little games from time to time, with a limited pot and masks."

"Masks?"

"Yes. Masks level the playing field. Otherwise she would read our faces and know what cards we hold. But in the game here tonight, only you and she will play. You will not wear a mask—just your regular poker face."

"So the theory is, she reads my face—my *poker* face—and knows when to raise and when to fold?"

"Yes."

"And if she breaks me, that validates F.A.C.S., and I'm supposed to sign your warrant?"

"Yes, sir. That's the idea."

"And if I break her?"

Collins shrugged. "Then we haven't validated F.A.C.S. and you don't sign the warrant."

"Okay. I'm in. But we play for stakes. Shall we start with a thousand?" He pulled a fat roll of bills from a jacket pocket, then noted Collins's hesitation. "Surely there's that much in the FBI slush fund. How do you pay your informants? Of course, you could lose your thousand, and still no warrant."

"Your Honor, it's just that we don't want to take your money . . . but . . . okay." Collins exchanged glances with Agent Martin. She nodded. "Well, okay. I'll write a check. And one thousand is the limit. Draw?"

"Draw is okay. Your deal, Agent Martin."

The game began.

She watched his face, he watched her face. She folded on the first two hands. On the third, with a flush, she stayed and raised. He raised. She studied his face a moment. He had good cards. She read him for a straight. She met him and called.

"Flush?" he grunted. "Okay, that wins." He laid his cards face down. He assembled the deck and shuffled. "Deal."

She watched his face as he looked at his cards. Not the best, she thought. I read probably two pair? Yeah. He's drawing one card. Odds against filling the hand by getting a third, eleven to one. He didn't make it. But it's only a game, and he'll bluff. Here it comes.

The judge separated several bills from his money pile and shoved them into the pot. He smiled at Agent Morgan. "That's fifty dollars."

She looked at her cards. Three nines beats two pairs. "Meet your fifty, raise you a hundred."

Raises went on for a couple more rounds. The judge said, "Last round, all or nothing. Okay?"

"We might as well quit here, Judge. You probably hold two pair. That's the next to lowest hand in the deck. I have three sixes."

He looked at her with narrowed eyes. "You read my face? With F.A.C.S.?"

"Yes, sir"

"The cards weren't marked?"

"Fresh deck, sir. You broke the seal."

"How did you do that? The scientific basis, I mean."

"I read your poker face, Judge. The

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

human face has forty-three principal facial muscles. They work in combination. Two muscles give 300 combinations—what we call 'Action Units.' Three muscles give 4,000, five give about 10,000 visible facial configurations. Of these, about 3,000 mean something, though with a lot of duplication. On that last hand, for example, you thought your face showed nothing. You picked up your cards. You studied them. You squinted—what we call Action Unit Seven. Just a fraction of a second—a 'microexpression.' The lay observer would miss it. That was followed quickly by Action Unit Twenty-three—narrowing of the red margin of the lips. That's anger, just a flicker, very easy to miss. You didn't know you showed it, but your face has a mind of its own. Seven plus twenty-three said, 'I have a lousy hand.'"

"And you also knew when I had good hands?"

"Yes, sir. You showed a combination of Action Units Six and Twelve—contracting the orbicularis oculi, pars orbitalis—the muscles that raise the cheeks, in combination with the zygomatic major, which pulls up the corners of the lips—a sure sign of happiness. No contest there. I gave you the pot."

"But you never met that suspect—Drake? You just watched him on closed circuit TV? But you say you can tell he's hiding smallpox. How?"

"Maybe not smallpox, Judge. But he's fearful of something—afraid he will be caught. We have the tape here. Let's watch."

She turned on the VCR. They watched a man standing on the steps outside an apartment building. "Simon Drake," said Collins.

Drake paused a moment, then came down the steps. His olive-hued, pockmarked face was a calm blank, his eyes, mouth, beardless cheeks immobile.

"There!" she whispered. "You see that?"

"What? See what?"

"Look again." She ran the tape back, then forward again in slow motion, then stopped. "There. For 3 milliseconds. Action Units One, Two, Four, Five and Twenty. Inner brow raiser—frontalis, pars medialis, plus the other brow raiser—that's fear. Not to mention—"

"Never mind. I take your point. Just one more little thing." He pulled a packet of photographs from his pocket and handed it to her. "Try these. Four men. Frontal views. What can you tell me about them?"

She spread them out on the table, studied them briefly. "Okay. This one: child abuser?"

He nodded. "Check."

"Number two: possession with intent to distribute?"

"Yes."

"Now this one: he sits on death row for a murder he can't remember committing?"

"So he says."

"And number four is a young man with a beard, which fails to conceal Action Units Six and Twelve—happiness, actually a high euphoria. Perhaps he has just received his grades for his final semester of law school. Straight 'A's? He has several job offers even before he takes the Bar. But it's all overlain by a strong sexual cast. He is thinking of a girl."

The judge held up a hand. "Whoa!"

She smiled and pushed the photos back to him. He replaced them silently. Collins looked at them both, puzzled.

The judge said, "One more question. Have you ever used this stuff in a life-threatening situation?"

"Well, yes sir. A chap on the street flagged down our car. Cass—Agent Collins—was driving. We pulled over and he rolled down his window. I saw the man's face. I read, 'I will now kill you both.' His coat was unbuttoned. He started to pull it back. I was faster. I fired across Agent Collins and through the open window. One shot, between the eyes."

"He had a gun?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"No, sir, a flame thrower. We tested it later. It worked fine. He would have roasted us. They studied the tape, but they couldn't tell whether I fired before or after he exposed the flame thrower. But the reviewers assumed it logically had to be after, and that's how they reported it to the director. At that time, nobody believed in F.A.C.S."

"I was deaf for a week," said Collins.

The judge took a deep breath. "Okay, you win. Next time we play poker, I'll wear a mask." He reached into an inner pocket, pulled out the warrant, signed it, and handed it to Agent Collins.

Preparations

They met in an empty room in a building opposite the Bradley Arms: Collins, Jennifer, Fann and two more agents. "I don't plan a big raid," Collins explained. "That might alert him, give him time to flush the bugs down the john. No, we go in very quietly. Three of us—myself, you, Martin, and you, Fann, will wear surgical gloves, protective gowns, shoe covers, and full face masks with high efficiency particulate air filters. You, Watkins and you, Stirling, won't be exposed, and you won't need any of that. Your job is simply to clear the building and then stop anybody from going in or out during the search. Agent Fann will search the apartment. If he finds anything that looks like smallpox, I'll check it out in our portable DNA analyzer."

Fann said, "What am I looking for?"

"When it left Russia, it was three little vials. But here we might not find vials. It may have been transferred to cans, or maybe it's just loose somewhere, or may be absorbed into something. All you can be sure of is it will be well hidden."

Fann muttered, "That's just great."

"If you don't find anything, Martin takes over."

The two new agents stared covertly at Jennifer. She looked away. Except as her job might require, nowadays she rarely looked directly at faces anymore. They all showed their secrets. Mostly they were troubled, sometimes they were neutral, but few were really happy. A simple greeting from her would evoke a pleasant reply from lips, eyes, brows, that might hide a tragedy from the world, but not from her. She didn't want to know. Her F.A.C.S. trainers had warned her that this would happen, and not to let it bother her, just go on, let them be whatever they were. Most of them wouldn't know she could read them anyhow.

"And if she doesn't find anything?" said Fann.

"We withdraw. But meanwhile we take precautions at every step. We three have been vaccinated, but I remind you that 3 percent of all vaccinations are ineffective. We will wear our masks at all times. Martin will carry a liter of sodium hypochlorite in case of a spill and I will carry a cylinder of chlorine dioxide if we need to fumigate. Jen, you'll also have to carry the cameras and place them."

"We ought to get hazard pay," growled Fann.

The group leader studied him benignly. "Bob, there are compensations. If you catch it and die, you'll be famous—the first case of smallpox in the whole world in fifty years. The contributions will pour in. Your widow will be rich. Everybody ready? Let's go."

The Search

Collins pushed the doorbell button at 1-D and a few moments later they heard footsteps approach. They waited a moment to let the occupant study his visitors through the peephole. Then the group leader held up his I.D. and called out, "FBI. We have a search warrant. Will you please open the door?" He waited a long moment, and was about to add, *or we will break it down.*

The door opened and Simon Drake stood before them in his bathrobe. He looked at them, they looked at him. He was unshaven, holding a cup of tea, and he looked as though he had just

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

emerged from a restless sleep. Jennifer watched his face and caught an involuntary microexpression—just a flick—the raised upper eyelid, a sure component of pure anger.

Drake sighed. "Oh, come in, if you must. But would you mind telling me what you're looking for?"

"Smallpox," said Collins.

The tenant snorted. "Smallpox? You people are so weird. For the record, I protest. Mind if I call my lawyer?"

"Go ahead."

"It'll take him a few minutes."

"Meanwhile, we'll proceed with our search."

Drake shrugged, bowed to the inevitable. His dark features froze into an expressionless mask—actually a relief to Jennifer. She did her best work with such subjects. They were unaware that revelatory microexpressions flit across their faces from time to time.

C. Marvin Sparo arrived a few minutes later. The lawyer was a nervous, birdlike, little man. He examined the warrant, and he protested. "On information provided by a F.A.C.S. expert? Whatever is that? We'll move to exclude!"

And he protested the cameras. Collins explained, "They prove we kept within the rules."

He protested the general bother and inconvenience to his client, and he followed them about with warnings to be careful at peril of a heavy damage suit.

Fann's search was rapid but thorough. All the drawers of bureaus and desks. All chairs, the sofa, all items in the kitchen. The range, refrigerator, microwave. Bookcases, books. The agent took wall, floor soundings, checked the garbage can and the waste baskets. The closets. All clothing, including that presently worn by the suspect. Drake followed the agents as they worked. From time to time, he smiled into the several recording cameras. Jennifer trailed along silently.

After an hour, Agent Fann reported, "Nothing."

At which Attorney Sparo whirled on them triumphantly. "Okay! That's it! Mr. Drake is suing the bunch of you, the FBI generally, each of you jointly and severally, plus the judge who issued this cockamamie warrant. Twenty-five million! No! Fifty million! Just wait until I get this in front of a jury! You people need to be taught a lesson!"

Drake was a few feet away. He smiled in grim silence, then spread his hands as though to say, "See?"

Collins waved attorney and client aside impatiently and called over to Jennifer. "Anything?"

"One moment, please." She finished replaying a short section of a disc on her DVD monitor, then turned to Collins. "The air circulation is off?"

He raised his eyebrows.

She nodded. "In the hall closet."

"Nonsense!" declared Drake.

She said, "It's in the vacuum cleaner—the bag."

Drake hesitated. "Now look, it's not what it seems. I can explain that. A little biochem research. It's ready for the garbage. I was just cleaning up. Nothing sinister at all. You're making a big mistake."

The woman continued. "I will now open the bag. This is for DNA confirmation. I will take only a trace, but some of the dust may escape." She looked back at the lawyer. "Mr. Sparo, have you been vaccinated within the last ten years? No? Then you should either leave or wear a mask."

The attorney wet his lips, looked at them all in turn. "This is real?"

"Yes," said Collins.

"How about *him?*" Sparo pointed to his client.

"He's okay," said Collins. "He's had the disease. He's immune."

"Okay, I'm leaving, but you'll hear about this!"

As he left, Jennifer opened the closet door and pulled the vacuum cleaner out. The bag was full. Collins looked at it and his eyes narrowed. She moistened

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a toothpick, pulled the dust bag up a little, inserted the toothpick and handed it to Collins. He thrust it into a receptacle in the analyzer and turned on the monitor. "Takes just a moment. The I.D. process is simple and definitive. The virus ball contains 186,000 base pairs of DNA, and the DNA contains about 187 genes. It untangles the ball, spreads out the base pairs into a long line. If that line matches our precoded line, it's smallpox. Yep. A good match, and enough here to paralyze the East Coast within two weeks. After that, the whole globe would be at risk." In a swift casual motion, he took a pair of handcuffs from his belt and locked Drake's hands behind his back. "Sir, I am charging you with possession of smallpox virus with intent to distribute. You have the right to remain silent . . ." He finished out the rote Miranda.

"We'll have to take the whole vacuum cleaner," Fann said. "We should have brought a big evidence bag."

"I did," said Jennifer. She unfolded one from her pack and handed it to the agent.

Fann worked the cleaner into the bag and sealed it. He said, "Okay, Jen, now explain. Please."

"Just the F.A.C.S., Bob. When we first walked in, I noted a very subtle microexpression of distress or unhappiness. It was only in the eyebrows—in fact, just in one eyebrow—the right inner eyebrow, raised in an unmistakable Action Unit One. Very brief, not doing it voluntarily. He's hiding something, something tremendous. It's here, just a question of finding it. And then every time you got close to the closet he showed fear. When you opened the door and pulled the vacuum out, his fear redoubled. And when you felt the dust bag he nearly went ballistic, with Action Units One, Two, Four, Five, and Twenty. But then when you reported 'Nothing,' he flashed what we call the Duchenne Smile. It's quite involuntary—he didn't even know he was doing it. Action Units Six and Twelve. The zygomatic major is especially prominent."

Fann frowned. "Odd. He was showing all that? I didn't see anything."

"They were all microexpressions. You had to watch for them."

"Time to clear out," Collins said. "While I take Drake down to the car, I'll leave it to you two to bring the evidence and the apparatus and close the scene. Maybe fumigate, string the crime scene tape, all that stuff."

Afterword

Later that afternoon, as they were leaving the Federal Building, Collins said. "That was a remarkable job, Jen."

She mumbled something. She was thinking back. Her F.A.C.S. trainers had told her, *you're now a member of a very elite group. In the world, there are only five hundred certified F.A.C.S. experts. It's a new world, where everything is open to you, but it's also a world of isolation. You cannot tell them you know.* She knew Collins was going through a traumatic divorce. He thought he hid it. Fann was happy with a new mistress—a girl he could not present to his parents. She did not want to know these things, but she did. *Well,* they had warned her, *it's a trade-off. As your powers peak, you may feel a certain loss of identity.*

"Jen?" Collins was talking to her, asking her something. She came back to Earth.

"The judge back there at the card game. Those photos he showed you. You really impressed him. Me too. And the guy with the beard. Sex, you said? What was that all about?"

"He was taking an amble down memory lane, Cass. In his job as assistant D.A., the first three photos were his first three defendants."

"I get it. But . . . *sex?* "

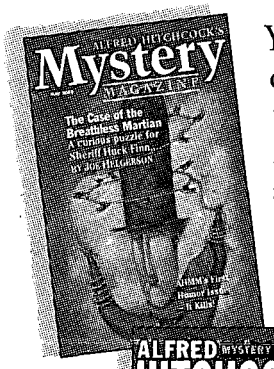
"Their Bermuda honeymoon, Cass. He had a lot on his mind." ■

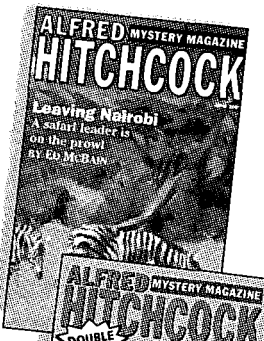
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

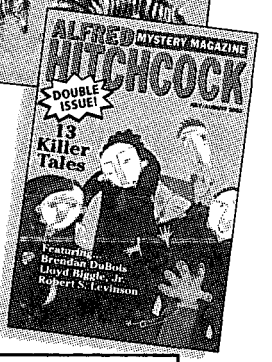
MYSTERY VALUE PACK

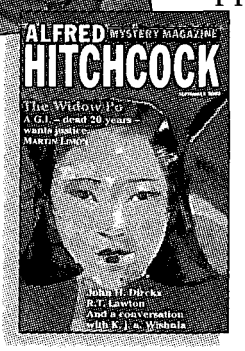
4 magazines for just $5.95!

Give yourself **chills** with our value pack of 4 best-loved issues of **Alfred Hitchcock's Mystery Magazine!**









You'll enjoy dozens of captivating tales from world-renowned masters of suspense and talented new writers alike — all for just $5.95 plus shipping.

You save 50% off the regular price.

It's easy to order. Just fill out the coupon below and mail it to us with your payment. **Your satisfaction is fully guaranteed!**

DELL MAGAZINES
Suite SM-100, 6 Prowitt Street, Norwalk, CT 06855-1220

☑ **YES!** Please send me my **Alfred Hitchcock's Mystery Magazine Value Pack.** I get 4 entertaining issues for just $5.95 plus $2 shipping and handling ($7.95 per pack, U.S. funds). My satisfaction is fully guaranteed! My payment of $_____ is enclosed.(AHPK04)

Name: _____
(Please print)

Address: _____

City: _____

State: _____ **ZIP:** _____

Please make checks payable to Dell Magazines Direct. Allow 8 weeks for delivery. Magazines are back issues shipped together in one package. To keep prices low we cannot make custom orders. **CT Residents**: Please add 6% sales tax to your total order. Add $4 additional shipping and handling for delivery outside the U.S.A. Offer expires 12/31/04. 93C-NQHVL2

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

VISIONS OF GINGERBREAD

Bruce Holland Rogers

Attitude alone doesn't solve problems, but it does play a part. . . .

I have never fired anyone on the night of the Christmas party. Not quite. But my employees always give me a wide berth at the annual event. It reminds me of my failure to escape the family spice business.

Once upon a time, decades ago, I had turned on, tuned in, and dropped out. My generation had set out to change the world, and my particular contribution was going to involve the cultivation and low-cost distribution of marijuana. After the revolution, pot would be legal. Everyone would smoke it. Everyone would be mellow.

The revolution never materialized. When my girlfriend, Rainbow, got pregnant, she didn't want to live in a tipi any more. She wanted running water. She changed her name back to Mary Ellen. We got married.

After I finished college with a degree in botany, I took over the family business. Now, thirty-five years after my return as the prodigal son, I had my father's office, his ulcers, his heart condition, and his temper.

At this year's party, as usual, everyone from my executive VP to the mail clerk steered clear of me. An hour into the evening, as conversations buzzed in every other part of the room, I found myself standing alone, eggnog in hand, looking at the Christmas tree. It was as if I had never seen one before. There was something about the shape of the tree, about its deep green shadows and its smell, that spoke to me. It said, *forest.* It said, *everything is alive.* It said, *this is the perfect moment.* And at that perfect moment, I felt as if I were a key sliding into its lock. The Universe and I, we fit.

God was in the tree, in the lights, and everywhere in the room with me. God was in the eggnog. I thought, *LSD flashback? After thirty-five years?* But on acid I had never felt anything like this wholeness and clarity.

"You look a thousand miles away," said a woman's voice.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I turned. I didn't know her. Her hair was severely short, mannish. But I smiled. "No, not a thousand miles away," I said. "I'm very much right here."

"Enjoying the party?"

"To my surprise, I am."

"Would you like to hear a crackpot theory?"

I laughed. Who was she? I didn't care. "Tell me."

"You know that nutmeg is a hallucinogen."

"Not one that you'd take twice."

"The voice of experience?"

"I am a child of my generation, Ms. . . . ?"

"The psychoactive ingredient is thought to be myristicin."

"No," I said. "That's wrong. Synthetic myristicin doesn't have the same effect. A nutmeg high probably has to do with myristicin in interaction with other, similar molecules. There's a whole stew of them in nutmeg." I looked at the eggnog in my hand, at the grains of nutmeg floating on the top. Could my euphoria be nutmeg-induced? But you had to choke down tablespoons of the stuff to get a buzz.

"That's right," she said. "There's a plant geneticist, a Dr. Thorpe, who has done some gene splicing. With nutmeg. Also with star anise, parsley, and parsnip."

"They all contain myristicin," I said.

"Yes."

I smiled. "I had similar interests once."

"So I've heard."

"Does this Thorpe fellow think he's going to make hallucinogenic tomatoes?"

She looked around the room. No one else was paying any attention to us. "Actually, the spliced genes are synthetic. Thorpe tweaks segments of DNA to produce mutations. And one of those mutations resulted in an analog to myristicin that has some fascinating properties."

Earlier, I had felt the Universe suddenly resolve and make sense. Now the same thing happened for our conversation. I looked at my eggnog. "Let me guess. One of those fascinating properties is that the analog is active in small concentrations. Would that be right, Dr. Thorpe?"

"Another property is that it doesn't interfere with mental acuity. An ordinary nutmeg high would make you dopey. This won't."

In other circumstances, I might have thrown my drink to the floor, called security, and had Thorpe thrown out. Or arrested. But God was in the nutmeg. And I liked Thorpe. I liked her to an unusual degree. I took another sip of God. I felt loved.

"I've done some brain scans," she said. "My nutmeg stimulates the part of the amygdala associated with religious experiences."

"The what?"

"There's a part of your brain that triggers the experience of oneness with the Universe. Of seeing God. Brain scientists can tickle that region of the amygdala with an electrode and give you a religious experience."

"Wait. If an electrode or a drug can make you see God, does that make God an artificial experience? A lie? Or does the stimulation just open your awareness?"

"See? No interference with mental acuity. You're still sharp."

"Answer the question."

"I'm agnostic. What matters to me is the practical effect. People have these experiences, and the experiences change their lives. People who have seen God are less anxious, less aggressive. The drug metabolizes completely in about forty-eight hours, but the psychological change lasts longer. Particularly if the experience repeats. And that's where the crackpot theory comes in. Because everything I've told you so far is real." She nodded at the eggnog in my hand. "As you can attest."

"Religious nutmeg. I'd have heard about this."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Nutmeg in its natural form is legal." She looked around the room again. Conversations all around us were animated, pleasant, and focused. Everyone looked so friendly, so interested in one another. Dr. Thorpe and I might as well have been talking in a soundproof booth. "However, not everyone would approve of the modified form."

"Ah. Because your crackpot theory is that people will change. Give the masses a taste of your nutmeg, and they'll be less afraid, harder to manipulate into hating one another."

"Not the masses. Just one good soul and one gingerbread cookie at a time."

I smiled. "I like you very much, Dr. Thorpe."

"You love everyone. So do I."

"What you need is a plantation."

"Yes. I have seed stock for you. A start, anyway."

"It will take time."

"I know."

"Nutmeg seedlings won't flower for at least four years. The trees aren't full-bearing for twenty."

"Believe me, I know," she said. "But a revolution doesn't happen in a day."

I looked around. The whole room glowed with adoring light. On Monday, all these wonderful people who worked for me would get a raise, and the company would get a new mission. We were going global. We were going to expand, but in a way that was friendly to customers and competitors alike.

The golden radiance around Dr. Thorpe's head might have been a hallucination. Maybe I was seeing auras. Whatever it was, it made me infinitely happy. ■

Believe those who are seeking the truth;
doubt those who find it.

—André Gide

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Special Feature

THE REASON WE'RE HERE

Geoffrey A. Landis

Gaia: "a tightly-coupled system whose constituents are the biota, the atmosphere, the oceans and the surface rock . . . [with] self-regulation of important properties like climate and chemical composition."

—James Lovelock

An animal—any multi-celled creature—is a complicated thing. Billions of cells, each specialized in function, work in concert to support life, adjusting the interior of the body to a warm, moist, pH- and salinity-adjusted environment optimally suited for life, distributing nutrition and oxygen, accumulating and eliminating waste.

An ecology, too, is a complicated thing. A working ecology will comprise ten thousand species, from microbes to hundred-ton trees, fitting into ecological niches that provide functions ranging from habitat formation to nitrogen fixation, each organism with its place in an energy cascade, each feeding on and breaking down the waste products of the next. An ecology, in its way, can be considered a living creature: it grows, adapts to changing conditions, and transforms its environment to better suit itself.

Taking this chain of thought one step further, evolutionary biologist James Lovelock proposed that the entire planet Earth can be considered a single organism. Earth is a living planet. As biologist Harold Morowitz states it, admiring the integrated, linked cycles of the atmosphere, hydrosphere, and biosphere: "In nature, individual organisms do not exist in isolation . . . In that sense, life is a property of planets rather than individual organisms." Life does not merely adapt to the planet; it actively modifies the environment, and does so in such a way as to make the planet more suitable for life. The planet is homeostatic. Lovelock has given this meta-organism a name: Gaia.

Some polemicists assert that humans are a biological plague on the planet Earth, a danger to the ecosystem, overpopulating and polluting the planet. Viewed from the Gaia hypothesis, though, we are not separate; we, too, are an integral part of the organism. Lest we get too proud of our position as part of the planetary cycle, through, let me remind you that the vast majority of the homeostatic regulation is done by bacteria. Bacteria are the true dominant form

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of life on the planet, not only outnumbering us, but outweighing other forms of life by a good amount. We're part of Gaia, of course, but not a major part. We do have our small role to play, primarily in breaking down soil to provide food and habitat for the bacteria.

Astrophysicists tell us that the Sun used to be much fainter. When life first started on the Earth, our star was about 30 percent dimmer than it is now. It is, in fact, useful to ask why the ancient Earth wasn't frozen solid into an iceball planet. The answer is the greenhouse effect: with a thick atmosphere of mostly carbon dioxide (and perhaps a little methane), the Earth was kept warm enough to keep water liquid, allowing life. Over the eons, as the Sun brightens, life has adjusted the atmosphere, removing carbon dioxide, stashing some of it away in the form of carbonates, which turn from reef to rock, and replacing some of it with oxygen (a poor greenhouse gas, but a nice gas to have around for energetic forms of life.) Over four billion years, bacteria have adjusted the amount of carbon dioxide in the atmosphere to keep the temperature just right, neither too low (freezing the oceans in an "icehouse" effect) nor too high (starting a runaway greenhouse effect and boiling away the oceans to a Venus-like atmosphere.)

Lovelock's Gaia concept can be thought of as a metaphor, a poetic way of expressing the ecological fact that all life is connected, but in fact the concept is a scientific hypothesis in at least one sense: it generates a prediction that is testable. Specifically, it predicts that we will find Mars and Venus lifeless, with neither current life nor any trace of fossil life. This prediction is a straightforward consequence of the Gaia premise that life adapts its planet: if the Gaia hypothesis is right, then if there were life on Mars, it would have changed the environment of Mars to make it more suitable for life. (If you argue that perhaps Mars is perfectly suited for some different kind of life, some hypothetical non-Earthlike "Mars life," all I can reply is even the most rugged, xenophile, radiation-resistant cryophilic anaerobes we can imagine are going to have a hard time maintaining more than a toehold on current-day Mars, spending most of their time in a non-metabolic, frozen state, waiting for the times when conditions are right and water can be briefly liquid on the surface. It's not a good environment for life.)

So the search for life on Mars, in its way, is a test of the Gaia hypothesis.

In the long term, the Gaia entity has a problem.

The Sun, as I said earlier, is getting brighter, and as it gets brighter, Gaia has been responding by pulling carbon dioxide out of the atmosphere, reducing the greenhouse effect. It's a nice thermostat, and Gaia has been doing it for four billion years.

The problem is that the Sun is still getting brighter. For the nonce, Gaia can keep on removing carbon dioxide from the atmosphere, but that strategy won't work forever. In a few hundred million years, or maybe a billion (that is to say, pretty soon in geological terms) Gaia will have removed all of the carbon dioxide, and then the planet is going to heat up. In a billion years—maybe two billion—the oceans will start to evaporate, adding greenhouse water vapor to the atmosphere, and then the runaway greenhouse effect will make the planet like Venus.

What next?

Keeping the planet cool is too hard for bacteria: it needs intelligence.

So it seems to me that we have an important role to play in Gaia after all; in the long term, we, or something like us, are needed to regulate the temperature of the planet. I'm not talking today's minor greenhouse warming here; I'm talking about the long-term survival of the planet. When the Sun brightens, Gaia will need planetary engineering on the grand scale. It's something an intelligent

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

life form is needed for, and right on schedule, Gaia has produced an intelligent life form.

So, the way I see it, Gaia has a use for us, and it needs us specifically as technological animals. We can't turn our backs on technology, or on space; that's what we're here for.

On the other hand, although the brightening Sun will require intelligent beings to deal with, that doesn't necessarily mean *us*. After all, Gaia has a few hundred million years before the problem starts to get acute. That's a short time on a geological scale, but it's long for a species. If we don't work out, Gaia has plenty of time to try different species, until one does. We're new on the block, the first draft of an intelligent species for Gaia, but we're unlikely to be the last.

So don't get cocky, kid. ■

"What organisms do to help themselves survive may affect the planet in enormous ways that are not at all the reason those survival skills were favored by evolution."

—Tyler Volk, *Gaia's Body* (1998)

More reading:

James E. Lovelock, *Gaia: A New Look at Life on Earth,* Oxford University Press 1979.

Lawrence E. Joseph, *Gaia: the Growth of an Idea,* St. Martin's 1990.

Tyler Volk, *Gaia's Body,* Springer Verlag 1998.

Chat online
with your favorite authors!

Fall Folios **October 14 @ 9:00 P.M. EST**
Hook up with Lois McMaster Bujold (author of *Paladin of Souls*), Chris Moriarty (author of *Spin State*), Michelle M. Welch (author of *Confidence Game*), and Liz Williams (author of *Nine Layers of Sky*) to find out about their fall releases.

Happy Halloween **October 28 @ 9:00 P.M. EST**
John Shirley (author of *Crawlers*), Elizabeth Hand (author of *Bibliomancy*), Christopher Golden (author of *The Gathering Dark*) talk about the chills that thrill.

Terry Pratchett **November 11 @ 9:00 P.M. EST**
Chat with him about his new book, *Monstrous Regiment.*

Go to **www.scifi.com/chat** or link to the chats via our home page (**www.analogsf.com**). Chats are held in conjunction with *Asimov's* and the Sci-fi Channel and are moderated by *Asimov's* editor, Gardner Dozois.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A MISSION TO THE EARTH'S CORE

Adventure stories involving the exploration of the interior of Planet Earth have a long and distinguished history in science fiction. Jules Verne's *Journey to the Center of the Earth* (1864) was perhaps the first such tale. Despite its title, the story involves explorers following the instructions of a seventeenth century runic message on a trip that descends into the crater of an Icelandic volcano and into a long tunnel connecting to a vast cave containing a conveniently phosphorescent ceiling, an ocean, islands, dinosaurs, and mastodons, all many miles beneath the surface of the Earth, but not very close to its center.

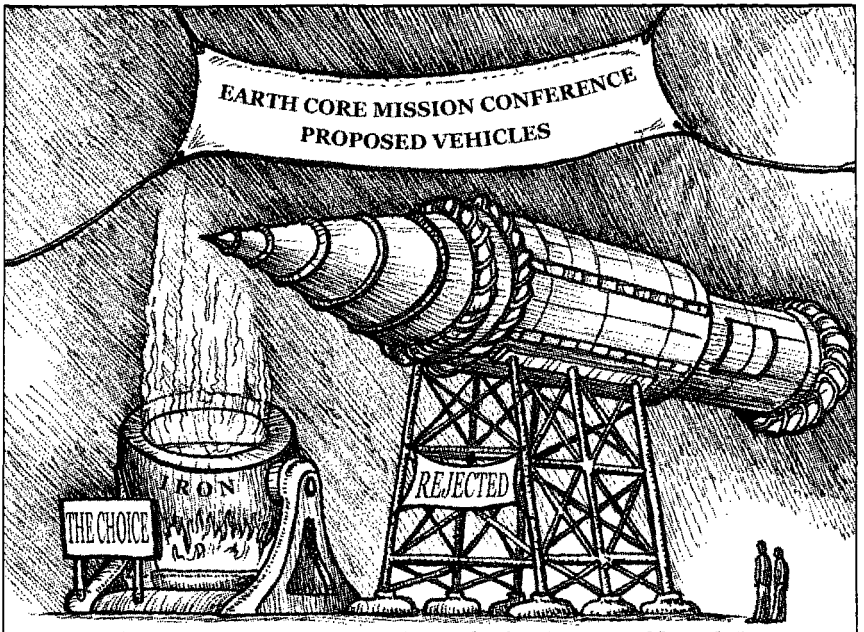
Following Verne's lead and doing considerably more violence to the sciences of geology, paleontology, and physics, Edgar Rice Burroughs wrote seven novels beginning with *At the Earth's Core* (1922) that were set in Pellucidar, a "land" occupying the inner surface of a vast spherical hole in the Earth's hollow interior. Pellucidar had a sizable ocean and more land area than Earth's outer surface, its own internal sun and moon, and was populated by mastodons, dinosaurs, and an intelligent but rather nasty reptilian species called the Mahars. Burroughs' various protagonists (including Tarzan) traveled to Pellucidar in a variety of ways, including a mechanical mole machine, arctic pirate expeditions, and a vacuum-filled magnesium dirigible.

Unfortunately, Burroughs got the physics of hollow planets completely wrong. The Mahars, dinosaurs, and explorers would *not* be pulled to the inner surface of Pellucidar by inside-out gravity. As Isaac Newton first proved, because of the inverse-square law, the pull of gravity anywhere in the cavity of a thick, massive, hollow sphere is zero, because the pulls of gravity from below and above any point exactly cancel. Would-be inhabitants of Pellucidar would find themselves floating around in free fall.

Not immune to the pull of the Earth's interior myself, I once wrote an almost-published piece about the exploration of the Earth's core. Near the end of the original manuscript of my hard SF novel *Twistor*, there was a long scene in which my protagonists David and Vickie, with some help from Boeing Aerospace, built a special "inner-space craft" vehicle that used gravity and the twistor effect (a "rotational" interchange of normal matter and shadow matter) to do a 38 minute in-vacuum free-fall through the Earth's interior gravitational field to the other side of the planet, sampling snippets of the Earth's interior all along the trajectory to the center and back and exploring for the first time the "inner space" of our world. Unfortunately, my editor in his wisdom decided to halt the narrative at an earlier point and removed this scene from the published version of the novel, so few people have actually read my inner space adventure.

Now, however, there's some new writing about the exploration of the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



"There's an issue about which one *looks* like it would work."

Illustration by Wolf Read

Earth's core, but this time it's not fiction, but a serious scientific proposal. David Stevenson, a Professor of Planetary Science at CalTech, has proposed mounting an ambitious NASA-style mission to the Earth's core. He describes his "modest" proposal in a paper recently published in the journal *Nature*. Since Stevenson has not yet mastered the use of the twistor effect, he describes doing things in a way that cannot be accused of small thinking. Among other resources, he would use a multi-megaton nuclear weapon and an hour's worth of the net iron production of all the Earth's iron smelter facilities (~10^8 kg). In this column, I want to describe this proposal.

Stevenson is faced with the basic problem of how to get through all the rock between the Earth's surface and its core. Anyone who has ever dug a post hole recognizes the problem. Something like Abner Perry's mole machine, which supposedly took Perry and David Innes to Pellucidar, couldn't really do the job. We now have well-engineered digging machines designed for efficient tunneling, but they can't go down more than a few thousand meters. Deep well-drilling techniques are not much better. The deepest drill hole, dug in the Kola Peninsula in Russia, goes down only 12 kilometers.

To avoid mechanical digging, Stevenson has proposed a more radical approach: *melt* your way through the rock. It takes about a megajoule of energy to melt a cubic meter of rock, assuming that the rock is already hot enough to be near its melting point. Therefore, melting a tunnel that is 3 square-meters across and 6,380 km long, all the way to the Earth's center, would require about 2×10^{13} joules of energy. That sounds like a lot of energy, but consider that a large nuclear power plant produces about 8×10^{13} joules per day, so we are in the right energy ballpark. The chal-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

lenge is to find a vehicle that can withstand the heat and pressure of the Earth's interior while making the trip.

Stevenson's "vehicle" is a large blob of molten iron. Iron is very heavy, with a density of 7.87 grams per cubic centimeter, as compared to a density of about 2 g/cm^3 for rock. Therefore, a large blob of sufficiently hot molten iron would tend to produce a "China Syndrome," melting its way through the Earth's crust, losing thermal energy, but gaining gravitational energy as it went. Paleontologists believe that the iron at the Earth's core got there in just that way.

Stevenson would start the process by finding a suitable fissure in the Earth's crust, setting off a multi-megaton underground nuclear explosion to widen the fissure to a sizable crack, and then dumping in an instrumented blob of liquid iron (melting point 1535° C) with a mass of about 10^8 kilograms—the amount of iron in a sphere about 30 meters in diameter. The blob would then assume an elongated shape that would fill a part of the crack and cause the crack to propagate downward under the pull of gravity, melting the path in front while liquid magma flowed around the outside of the iron mass and sealed the path behind. As the iron blob moved downward, despite the high pressure from below, it would achieve a fairly high velocity. Assuming that the iron elongates to melt a path about one meter across, its downward speed would be about 30 meters per second. At that speed, it could reach the Earth's core in about two and a half days.

The problem with this scheme, of course, is that a blob of molten iron that is subjected to the very high pressures in the Earth's interior does not provide a very good mode of travel. This rules out manned "inner space flight." The "passenger" would have to be neutral buoyancy micro-miniaturized robotic instrumentation that would relay measurements from the core to the surface of the Earth. How to accomplish that information transfer is also a challenging problem.

Today's microprocessors are made of silicon (melting point 1410° C) and can't operate at high temperatures. The instrumentation package would either have to be locally insulated and cooled or would require a presently unknown hot microprocessor technology. Further, getting the measurement information from the probe to the Earth's surface would be very difficult. There could be no trailing wires, no light beams, and no radio waves, so Stevenson proposes to use acoustic signals with a radiated power of about 10 watts for the duration of the mission. The frequency of the acoustic waves is limited at the high end by absorption by the rock and at the low end by seismic noise and the low rate of information transfer. Stevenson proposes an acoustic signal frequency around 100 Hz for sending signals to a surface detector similar to the LIGO gravity-wave detector, but coupled to, rather than insulated from, the Earth's vibrations. This, he estimates, should allow the transfer of 10 megabytes or so of information during the several-day duration of the mission.

The power supply for the mission is yet another a challenging problem. Conventional batteries and fuel cells do not tolerate high temperatures any better than microprocessors. The thermoelectric nuclear isotope power generation used in some spacecraft would not work because the molten-iron environment is already hotter than the decaying radioactive isotope. Stevenson proposes to use a Stirling-cycle engine to tap into a part of the energy flow that occurs as the iron melts its way to the core, exploiting the temperature difference between the molten iron and the cooler surrounding rock. To me, that sounds difficult, and I also foresee a problem with the generator that the Stirling engine drives, since most magnetic materials, on which standard generators de-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pend, lose most of their magnetic properties in a high temperature environment.

There are sure to be other problems with the ambitious scheme. If the propagating crack containing the blob splits, it may also split the iron mass into two blobs that may not individually be massive enough to continue propagating to the Earth's core. Also, the envisioned communication link is one-way. As NASA-watchers know, space probes work best when there is two-way communication, permitting course alterations and program alterations to deal with unforeseen problems. Further, the pull of Earth's gravity downward diminishes linearly as the probe moves deeper, and I see nothing in Stevenson's calculations that takes this into account. Presumably there is some critical depth at which the iron blob would stall because the pull of gravity is insufficient to move it further or provide more gravitational energy.

Writing the environmental impact statement for the project should also be interesting. The proposal for the crack-creation process with a nuclear explosion is probably destined for collision with various international treaties and is sure to raise the ire of anti-nuclear activists. And it would probably be necessary to guarantee with a very high probability that the project would not produce a new active volcano at the launch site or generate massive earthquakes as it moved downward. I doubt that either of these scenarios is likely, but "proving" that with our present understanding of geology seems a formidable problem.

How much would the project cost? Stevenson's proposal has no budget attached, and he's a bit cagey about the cost. He points out that the cumulative cost of unmanned space exploration has been more that $10 billion, and that the exploration of the Earth's interior should deserve "a comparable or lower amount." My guess is that the price tag would be a few billion dollars.

That's a lot of money, but as I see it, the proposal would do more for society than the current administration's tax breaks for millionaires and would cost much less. In any case, the first step would not be implementation, but research into all the technical issues that the proposal raises. This research should make a start. It may be a long time until we can probe the Earth's core, but I think we should begin. ■

AV Columns Online: Electronic reprints of over 110 "The Alternate View" columns by John G. Cramer, previously published in *Analog*, are available online at: http://www.npl.washington. edu/av.

Reference:

The Earth's Core Mission:

"A Modest Proposal: Mission to Earth's Core", David Stevenson, available at http://www.gps.caltech.edu/faculty/stevenson/coremission.

This would be a much better place for children if parents had to eat the spinach.

—Groucho Marx

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

4 MYSTERY MAGAZINES just $5.95!

When it comes to knock-'em-dead detection, nobody outdoes ***Ellery Queen's Mystery Magazine.***

To introduce you to the award-winning fiction of ***Ellery Queen's Mystery Magazine,*** we'd like to send you a special value pack of four favorite issues for just $5.95 plus shipping.

Special introductory offer.

Save 50%

To get your value pack, fill out the coupon below and mail it to us with your payment today.

DELL MAGAZINES
Suite SM-100, 6 Prowitt Street, Norwalk, CT 06855-1220

☑ **YES!** Please send me my **Ellery Queen's Mystery Magazine Value Pack.** I get 4 back issues for just $5.95 plus $2 shipping and handling ($7.95 per pack, U.S. funds). My satisfaction is fully guaranteed! My payment of $_____ is enclosed. (EQPK04)

Name: _____ (Please print)

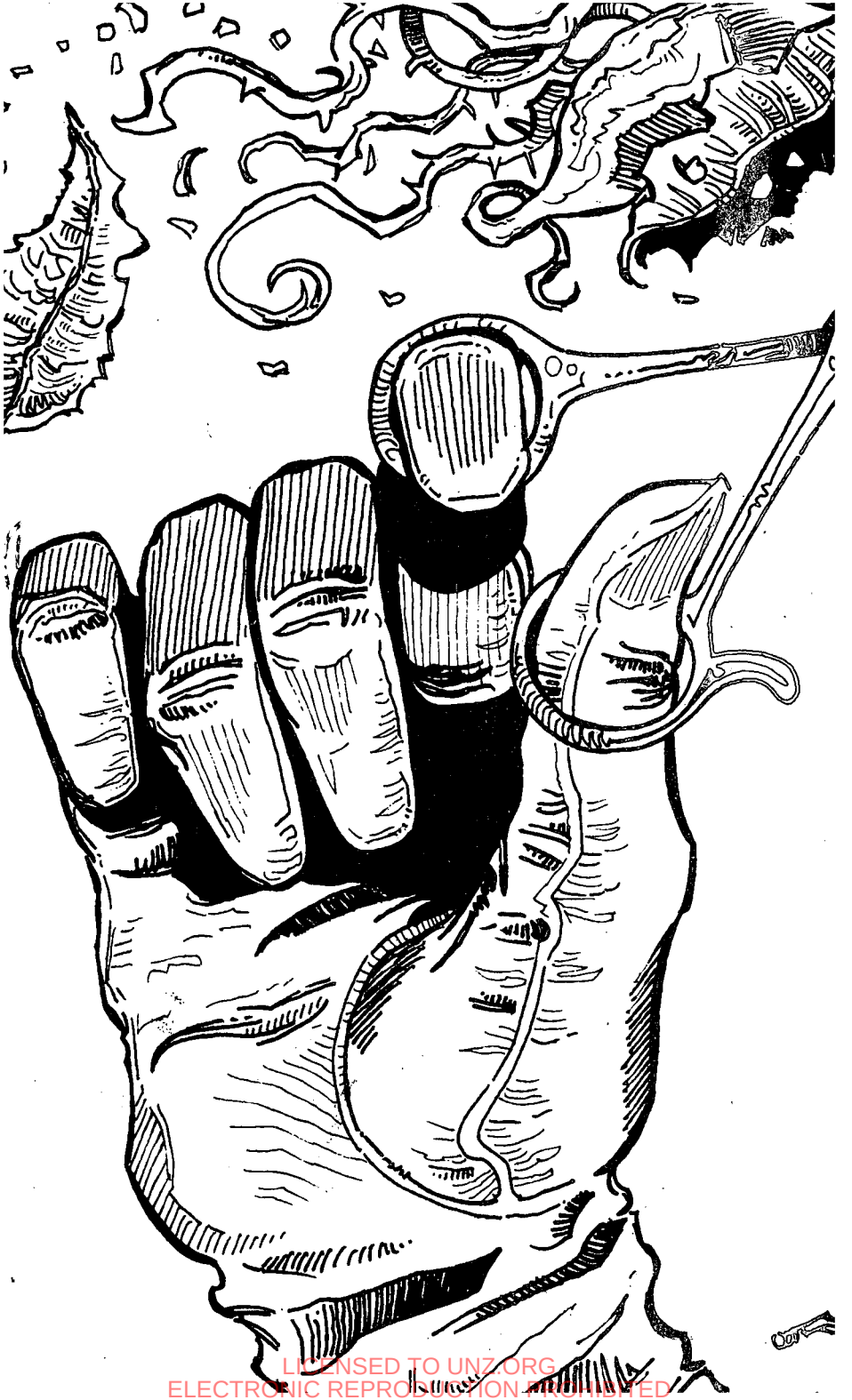
Address: _____

City: _____

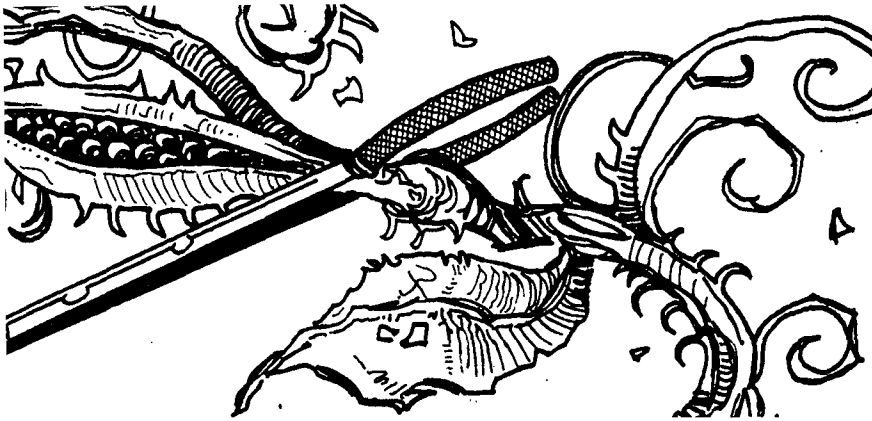
State: _____ **ZIP:** _____

Please make checks payable to Dell Magazines Direct. Allow 8 weeks for delivery. Magazines are back issues shipped together in one package. To keep prices low we cannot make custom orders. **CT Residents**: Please add 6% sales tax to your total order. Add $4 additional shipping and handling for delivery outside the U.S.A. Offer expires 12/31/04. 93C-NHQVL2

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



WINDINGWEED

Kyle Kirkland

Illustration by Rick McCollum

Prescribing a solution and implementing it are two quite different things.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The body of the Zhai alien was lying in a shallow ditch, with the upturned face and vacant eyes seemingly watching the beautiful sunrise. It was like peaceful slumber: as far as the medics could tell, the face—covered with thin, wispy gray fur—gave no hint of emotion or sign of violence.

The only human with any efficiency in reading Zhai emotions was Cecil Grummer, who grimly stood beside the body. The old man looked down on it with such obvious bitterness that some of the other observers cast worried glances his way.

Cecil had found plenty of emotion etched in the fur of the wolfish face. Ecstasy. It was written all over the dead Zhai's hair pattern.

"Sure do make a mess when they die," said a white-jacketed medical officer, standing next to Cecil.

Callous though the comment was, Cecil nodded absently. Although the face and skull were relatively intact, the body was not. The scene was grisly: internal organs were dispersed over several square meters. "The Zhaien need periodical injections to tolerate the Earth's atmosphere and climate," explained Cecil. "When this poor fellow died, the decomposing body gradually lost its protection and was exposed to an alien environment. Violent chemical reactions and bubbling gases did the rest." Cecil suddenly realized that the officer had probably never seen a Zhai—a live one—close up. "They're quite beautiful. Sleek and graceful. Bipedal, though they can run on all fours pretty well if they want."

"So what happened? Anybody know?"

Cecil caught himself staring at the green vines that were lying on the ground. He quickly looked away: "I'm afraid not."

The officer tsked. "Guess now I understand why the government keeps them so isolated. Think they'll go away? Cut off their visit?"

Cecil shrugged. He wanted to be hopeful—but it was hard. This was the third one. Every death is a catastrophe, but this one more than most. Bry would probably pack up and take his delegation home. Cecil sadly shook his head. And that would be that—so much promise, so little fulfillment.

After one last look, Cecil turned to go. Most of the medical team was gathered near their vehicle, preparing the special container into which they would place the remains.

A lone doctor stood by the body. When no one was watching she deftly plucked a green vine that was still in the grasp of the badly disfigured hand.

Cecil slowly walked into his large office, loaned to him for the duration of the great visit. He was not surprised to find Bry waiting.

Emotions in the Zhaien are expressed in the tiny muscles controlling the facial hair, as Cecil had eventually learned through a great deal of careful observation. And trial and error, too—even the renowned psychologist had not anticipated how intricate other beings could be. The angle and texture of the hair could be quite subtle. It had taken months just to learn how to communicate at a basic level with the aliens; there was still much that Cecil and his team didn't quite understand.

But this time Cecil could easily read Bry's expression from a single glance. The gray hair was puffed out and contorted—frustration.

At least he's feeling it too, thought Cecil. And, Cecil noticed, Bry was wearing a formal tunic: bright white with a red sash around the waist.

"It seems your planet has one too many surprises for us," said Bry. He rose as Cecil entered, but sat down again quickly. "Nothing like this has ever happened to us. We have no knowledge or experience with drugs that are so very harmful, yet so attractive."

"We've not experienced anything quite this bad, either," said Cecil, sitting

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in front of—not behind—his desk. No barriers to communication permitted. "But we have had problems throughout our history with drug use—that is to say, we've struggled with the allure of potent and harmful chemicals." Cecil had already hidden his cigar box in a drawer, and his cigarettes—still a pack a day habit, even though he'd reached sixty years old—were also out of sight. "In most cases our medical technology has managed to develop substitutes for some of these drugs, and detoxify the rest. We do still have an illicit substance abuse problem—heroin, for example—but thankfully it's not very serious."

"Heroin?" Bry straightened in his chair. Nearly two and a half meters tall, he could be imposing even while seated. "Is this another plant product? Your vegetation, my good friend, can be decidedly dangerous."

"Well, heroin is derived from a plant product, but it's slightly modified in the lab. It's hard to completely synthesize the whole chemical, though, so most of it does in fact come from a plant."

"Is this heroin of yours as widespread as this species—windingweed, as you call it—which is so potent to my people?"

"Fortunately not. Actually, windingweed isn't all that common either. It's a bioengineered form of kudzu, designed to withstand harsh winters but to grow much more slowly than the original plant. Its purpose was to provide some more greenery during the cold season, as well as to displace the fast-growing original, which it inhibits. But since it's quite related to kudzu, you'll probably need to avoid this plant as well. And maybe others. These plants aren't at all dangerous to us, though, and they're freely available and economically insignificant. But heroin's big business, I can assure you. Has been for a long time. Big money."

Bry paused, apparently in thought. The fur randomly twisted, without pattern or synchrony. "Heroin is legal in your world?"

"No, no. It's illegal." Belatedly Cecil realized he should never have brought it up. Damn it, he thought, I'm a psychologist, not a diplomat! "But, well, there's always a criminal class to distribute it if the money's good enough."

"Yes," said Bry, matter-of-factly. "I understand."

Cecil frowned. You understand all too well, he thought. Looking up, Cecil noticed Bry seemed to be studying him.

"I perceive," said Bry, "you have anticipated the decision that I must make."

"Yes." Cecil sighed. For the last four months he had spent a great deal of time with Bry, and he had grown to respect the alien very much. Bry was intelligent, honest, and straightforward without being blunt. Cecil smiled. "Sure hate to see you go."

Nearly all of Bry's facial fur twisted synchronously. A smile. "It's not what I would prefer either."

"Then don't."

"I think you know the answer to that."

"But, my friend, there may be more solutions to this difficulty than you realize." Cecil paused. Bry was not looking thoughtful—the hair was not in chaotic motion—and Cecil could not quite decipher the Zhai's expression. But Cecil felt that even if he were annoying the alien, he had to carry the argument further. Otherwise there was no chance. The greatest—so far only—opportunity for humans to learn and interact with beings from another world would vanish.

"Solutions?" prompted Bry.

Tonally, the Zhai—at least when they spoke Terran standard—had very little modulation, except for a combination of rising and falling phases that they had learned was generally appropriate for a question. But Cecil was relieved to note some degree of patience in Bry's currently straight facial fur. "I know this is a serious problem," said Cecil. "Our biomedical scientists are working day and night on it, and I'm sure your scientists

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

are too. But even in the meantime, until an antidote or a prophylactic can be developed, I think there is more than one solution."

"There is indeed, my friend. But we cannot risk any of them. Flight is the only logical choice." The hair curled slightly. Sympathy. "I am well aware that this is a terrible thing to do. I understand that we are the first 'others' that your world has encountered. You wish to learn all you can. Believe me, had I an option, we would stay. But there is no realistic alternative." Bry stopped for a moment, gazing out the window at the sunny morning sky. "I well knew Muyshai—the one who was found this morning. He had no serious weakness that I know of. He was not—how do you say?—profligate. And yet . . . you know what happened."

"Temptation can be curtailed, denied. I admit it's not pleasant, but if you were to impose stricter rules on your delegation and your staff . . . Or move to, say, Antarctica, where there would be no chance encounters. If you would deny them even the remotest opportunity—"

"Please, Cecil. I have thought of this. But what you're asking is impossible. To imprison a Zhai is to kill him. Why do you think we tolerate the injections? They're quite uncomfortable, I can tell you. But they're worth it if they allow freedom of movement, which all Zhaien must have."

"Then education is the answer. Teach all of your people about windingweed, tell them in no uncertain terms that its allure is a fatal trap. That they must not yield, that no matter how strong they think themselves to be, they will be harmed or even killed. Teach them to recognize windingweed's odor and avoid it completely! Drill it into them that they must not consume even the smallest seed nor the tiniest fiber, for that will inevitably lead to more, and more—until it's too late to stop. Simply educate them, Bry!"

"Does that work for your people? Did you educate their heroin desire away? Did you legislate their heroin use away?"

"Well . . . it works for some people, I'm sure." Cecil bowed his head in defeat: he sounded lame even to his ears.

"Why do you think it would work any better for us?" Bry's fur flattened against his skin. "You humans seem to share, even relish a misconception about my people. But despite what you think, we're not infallible and we're not omniscient. Hardly. We're a lot more like you than you seem to realize, and like you, we have plenty of problems. We're not very experienced explorers, we've not visited very many other worlds. We don't have all the answers. Indeed, we just keep coming up with more questions. And right now we simply cannot afford to add yet another entry to our ever increasing list of problems to solve. This windingweed of yours is just too dangerous. It kills too quickly."

"I'm sorry," said Cecil. "I'm not blaming you."

Bry's hair fluffed slightly. "I am the one who should be sorry. Forgive my outburst."

"Forget it. The thing is," said Cecil slowly, "we—the whole human race—cannot afford to let you go without . . . let's be honest: picking your brains."

"I hope you're not suggesting some sort of gruesome experiment." Bry's hair twisted synchronously.

"No," said Cecil, allowing himself a brief smile in return. "It's the platform I'm talking about. Nothing would be better than to have that technology. If we could travel through space as quickly and rapidly as you do. . . ."

"Even we are far from fully understanding it. Only a handful of our scientists can operate it. And I'm not sure it would work for you."

"But we're a lot alike, as you point out. Our physiology. It should work for us too. Won't you allow some of our observers to follow you back to your world?"

"That's a question worthy of discus-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sion, my friend. But I must admit that I am not at all inclined to like the idea."

"Because of what I mentioned earlier." Cecil pursed his lips. "Because there's always a chance for one rotten apple."

"Which would, as you humans say, spoil the whole bunch. How could I live with myself if I unleashed an irresistible but deadly drug on my world? It's no small risk, either. You just admitted that your race wants to 'pick our brains'; you could just as easily pick our wallets too, while you're at it. What a wonderfully lucrative smuggling opportunity for an enterprising member of your 'criminal classes.' How much would a Zhai pay for one more dose of windingweed?"

Bry suddenly perked up and cupped his right hand to an ear. He was silent for a moment.

That's another thing, thought Cecil. What marvelous communication devices they have!

"I must go," said Bry, standing up. "But I assure you that we will discuss this question further. Perhaps it will be possible to allow a limited amount of contact. We could, after all, both learn something from each other. Will you drop by our compound tomorrow around noon?"

Cecil nodded. He was happy to be given nearly a day to marshal his arguments.

The doctor who had grabbed the sample of windingweed from the dead Zhai had no idea exactly what the active molecule or molecules were. But she could make some educated guesses.

First, she gathered plenty of raw material. Then she mechanically separated the outer covering and the fibrous matter—which she felt safe in assuming were inert—from the rest of the plant. That left a greenish-white gelatinous substance.

She couldn't reduce it any further without knowing which chemicals to extract. But she was pleased that the substance was compact and easy to transport—and conceal. It would do.

Taking a delicate sniff, she found that it gave off a distinctive odor. This increased her confidence that the active ingredient was still within, for it was the aroma, she assumed, that had attracted the Zhaien in the first place.

Her assumptions were her own, and not based on extensive media coverage. Very little information about the Zhaien had been released to the public. The aliens had arrived via their "platform" about four months ago, producing a global degree of astonishment and fanfare and celebration.

And then, nothing. Or not much; just little news clips and sound bites. Aliens relaxing by the seashore (under heavily armed guard); aliens conversing with human negotiators (out of the public view, except for a rare video frame or two); aliens giving microscopically brief interviews to famous journalists and reporters and newscasters ("why, yes, we think very highly of your world").

But certain assumptions could be made. Their wolfish appearance and pronounced snouts indicated an excellent sense of olfaction.

And the deaths strongly indicated something even more important. Vulnerability.

The next day, Cecil stopped on his way over to the Zhaien compound and watched a little stream flowing peacefully through the woods. On the other side of the water was the compound, which was located in a desolate spot, as far away from the city as possible. The Zhaien preferred a rural setting.

They also preferred—actually demanded—the right to come and go as they pleased. This made security a particularly ticklish job.

The area was continuously patrolled by human security guards. Curiosity seekers were restricted to the "viewing area," a little cordoned area near the closest highway, from which you could

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

see practically nothing. Even so, there were always people there. And souvenir shops galore.

Glancing at his watch, Cecil discovered he was early. He had always been a prompt person; the Zhai, on the other hand, were more comfortable with a fashionable sort of tardiness. Cecil brushed the dirt off a rock, sat down and lit a cigarette.

Much to his chagrin, he had not come up with any compelling argument for Bry. But at least he had some ideas.

It was apparent that, unlike humans, the Zhaien had little experience with recreational drugs. Drugs were common here, and even certain behaviors, like gambling or role-playing, were considered drug-like since they affect the brain in ways quite similar to recreational drugs. Cecil fanned away an errant tendril of smoke that the breeze had blown into his face. For humans, these drugs and behaviors were generally harmless, since medical science had learned to compensate for or entirely eliminate the deleterious effects.

With the Zhaien and windingweed, though, the substance was deadly and no one had yet figured out a way to make it any less harmful. But if the Zhaien were properly warned, and safeguards were installed to prevent exploitative humans from taking advantage, what was the big deal? To Cecil, the Zhaien seemed to be disproportionately worried about the threat.

Cecil firmly believed that somehow he should be able to present the situation in a way that was acceptable to the aliens. After all, that was why he was chosen to be the chief negotiator: it was his specialty, and he was the person who pioneered the field. He was the world's first recognized "xenopsychologist," and had been back when it was purely a theoretical discipline.

But for all that, he was not confident in his ability to convince Bry. If there's one thing he had learned, the Zhaien were exceptionally cautious.

Cecil dropped his cigarette butt and crushed the biodegradable filter and detoxifier with his shoe. He rose and headed for the compound.

Somehow he would have to convince the Zhai that human company was worth the risk. The value of a continued human-Zhai interaction must be stressed, and precautions concerning windingweed would have to be emphasized. Cecil only hoped he could sound persuasive.

He found Bry strolling around the perimeter. Several human guards were following him and trying to be as inconspicuous as possible.

Bry appeared to be breathing deeply and fully. "Injection notwithstanding, Cecil, it's good to be outdoors. Blue sky, green vegetation—perilous though some of it may be—and white clouds. I must admit, you have a very pretty planet."

"We like it." Cecil noticed the human guards milling around, well within earshot. He gave them an annoyed glance, but they weren't budging. "Bry, perhaps if you've had enough fresh air for the moment, I can coax you to head back to the compound." Where we can talk in private, he thought.

"Indeed," said Bry. "I would be glad to offer you some refreshment." Bry stepped forward, his long strides covering considerable ground. Cecil picked up his pace, trying not to appear hurried.

"Have you given any more thought to our problem?" asked Bry.

"I have. I remain convinced that there is a solution that is satisfactory to both sides." Behind his back, Cecil crossed his fingers.

"Very good. After we arrive and become comfortable, let us discuss it."

Her name was Mira. She was employed by the Vreenam Emergency Medical Unit; the main reason they had hired her was that she was willing to do the dirty jobs that no one else wanted. That,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and the fact that Vreenam didn't check her references very well. They had accepted her medical degree and didn't ask any further questions—which was fortunate for Mira, otherwise they would have discovered that she had been fired from the hospital where she had last worked.

The water in the stream was slightly cool and clear. Her shoes sank in the mud as she waded out to the deepest part—only a few feet deep—and found an outcropping of rocks sticking out above the surface. Then, after mustering enough courage, she eased herself fully into the water and lay down in the mud, keeping her face and head free of the water but hidden in the rocks.

A moment earlier she had tripped one of the sensors—it had been unavoidable. She knew these sensors were there, she had seen them the other day when she had helped remove the dead alien. Guards would be coming. But they would find nothing after their usual cursory search, and they would, she hoped, attribute it to the comings and goings of a wild animal. She'd heard it happened so often that the guards were reluctant to even attend the sensor warnings. They had no wish to spend time investigating all the false alarms.

The guards finally arrived. Mira peered at them through a wedged-shaped opening in the rocks. Sure enough, they left shortly thereafter.

The stream, she thought, would be as good a choice as any for an avenue to the compound. She would slither like a snake along the bottom.

That idea was momentarily shelved when a sizeable crawfish darted out of an underwater crevasse as Mira crawled past. It went back to its hiding place quickly, but Mira fled the water with the same dispatch.

On the bank she hid among some shrubbery. She was wet, cold, and filthy. She pulled her hair out of her eyes and constantly surveyed the surrounding area as she stealthily moved toward the compound. Carefully she side-stepped all the sensors that she was able to see.

Finally she spotted what she had been looking for. Along the stream's bank was a group of Zhaien. Human guards, though probably nearby, were not in sight. Sometimes, she knew, small groups of Zhaien insisted on losing their constant human companions. She pulled out the waterproof bag from her pocket.

Mira scanned the group rapidly; the smallest Zhai quickly became her primary target. On his tunic was a bright medallion, which she first observed from a glint of sunlight. It was similar to the badge that she knew their medical staff wore. If that was actually what it was, it would be perfect.

Bry had no office at the compound. He had a "den" from which he evidently slept, ate, and carried out the business of conducting the exploratory mission. Cecil had been there several times before; it was all one room, with little or no partition between the various functional areas—kitchen, bedroom, mission headquarters.

Cecil was led not to the headquarters area but rather to a place where there was a profusion of comfortable chairs and sofa-like furniture. It made him very curious. What did it mean? Were they to be chatting as friends? Had Bry already decided what to do, and therefore no business would be transacted?

After a serving of water and a few pastry treats, Cecil felt anxious to begin. "My plan is this," he said, watching Bry's facial hair carefully for any feedback it might provide. "All humans that visit your world will be given thorough background checks. They will be painstakingly searched before entering the platform. And again upon arriving at your world, if you like. Our movements there will be heavily restricted—that's no big deal to a human, if it's for a relatively short period of time—and all of your personnel who could possibly come in

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

contact with a human will be given full training on the dangers of windingweed. They would know what to watch out for, and how to get in touch with the appropriate authorities if they encounter the substance. Meanwhile, we will carry out an aggressive campaign to kill as much windingweed as possible here on Earth. Nobody will miss it. It's not important to our ecology. And, of course, our respective scientists will continue to work on treatments and preventive measures."

Cecil searched Bry's hair pattern for a clue as to how his words were being received, but Bry's "expression" was inscrutable.

"Sounds perfectly reasonable, Cecil. But can you guarantee success? Can you guarantee that no windingweed will slip through?"

Cecil shook his head. "I cannot. I think the risk is very, very slim—but not zero."

"I see," said Bry. "Well, there are few guarantees in life. The platform, for example—we have suffered accidents. But it has rewarded us beyond all measure of the danger we face when using it. Some risk is inevitable, I suppose, in almost every endeavor. The question is. . . ."

Bry cocked his head slightly. For several minutes, he was silent and obviously preoccupied. Cecil remained quiet.

Bry's facial fur suddenly bristled. Then it fell down, sleek and smooth on his skin, so smooth that the all of the contours of the Zhai's face and skull showed through. Cecil watched with growing apprehension and dismay.

Clearly furious, Bry launched himself out of his chair. "A situation has arisen that requires my immediate attention, Cecil. I would like to ask you to accompany me. I believe we will find it relevant to the discussion at hand."

A cold shiver crept up Cecil's spine. He followed the rapidly striding Zhai outside. Cecil jogged to keep up.

They made their way to a small hut at the edge of the compound. Inside was a Zhai that Cecil recognized as the chief medical officer of the group. In his iron grip was a woman, whose small stature appeared even smaller next to the towering Zhai. The Zhai doctor gave Bry a packet of something, which Bry inspected.

Even without being told, Cecil sensed what had happened. He stepped over to the woman, glaring at her. "Fool! I hope you know what you've done!"

The woman stared sadly and quietly at the ground. Her pathetic condition gradually doused Cecil's fury. Not only was she dirty and miserable, there was also a thin trickle of blood coming from her mouth, and an ugly welt puffed up her lip and cheek. The Zhai doctor had not been gentle.

We're still animals, thought Cecil. Some humans think of the Zhaien as funny-looking bipedal wolves, but we're the ones who are uncivilized. Too given to temptation. Sheep that must be herded, beaten into submission when we do something wrong. As a whole, we simply can't be trusted. It's not her fault.

Cecil turned to face the two Zhaien. He felt a sense of calm that often accompanied despair. "I withdraw my plan, Bry. You were right and I was wrong."

"I fear that your reading of the situation is accurate, my friend." Bry's fur was still flat but not as sleek as before. His anger was subsiding too. "You know Wrei, our senior medical officer?"

Cecil nodded.

"You have, I gather, inferred what took place," said Bry. "We were quite fortunate. Wrei says that the woman offered him what appears to be a concentrated form of windingweed. However, it was not opened in his presence, so he was not exposed to the drug." Bry paused and looked at Mira. "The only question now is why. Exactly what was her plan?"

"Does it matter?" asked Wrei. His grip on the woman tightened; she flinched and groaned.

Cold bastard, thought Cecil. If they

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

hand her over to me, I'll just let her go. She probably had no idea of the consequences of her act.

"I suppose it doesn't matter very much," said Bry. "But I'm curious." Bry and Wrei eyed Cecil, who realized he was thus appointed as interrogator.

"Well?" said Cecil gruffly, turning to the woman.

She didn't answer, and in the following minute of silence Cecil took a deep breath. I'm a psychologist, he reminded himself—I should know better. Gently but firmly he said: "What's your name?"

No response.

"Do you understand what you've done?" Cecil diligently tried to keep his voice neutral. "Do you know what this substance can do to the Zhaien? How dangerous it is? It's very addictive—and it can kill them quickly. Why did you do it? What were you after?"

The woman didn't answer. Her gaze remained steadfastly downward.

Cecil turned to Bry and shrugged. "I don't know how you want to handle this."

"We will turn her over to you," said Bry. He glanced at Wrei, who released his grip on the woman. "We are on your world, subject to your laws. We will leave her disposition up to you, and query no further into the matter."

Before Cecil could reply, the woman spoke in a low tone. "A drug," she said. "My name is Mira. I'm sorry. I knew what I was doing. I wanted a drug."

Wrei's fur began to twist randomly. "Is that why you came to me? You knew I am a doctor?"

Eyes still lowered, the woman nodded briefly.

"I don't understand," said Bry. "You wanted to swap drugs? You were hoping, maybe, that we had some heroin?"

The woman looked puzzled. "I don't know what you're talking about."

"What sort of drug did you want?" asked Cecil.

"A drug to save my child's life." The woman looked up, a little defiance settling into her expression. "I helped develop it. It's a drug that can stop the progression of my child's disease. But it's also a drug that our government's medical agencies has forbidden—at least until the clinical trials are over."

Cecil saw the fur of both Zhaien twist chaotically. "In our world, a medicinal drug under development," he explained, "is tested for safety and efficacy before doctors are allowed to give it to most patients. Certain patients are enrolled, usually randomly, in a series of tests called clinical trials. It's a long process that generally takes years to complete, but it helps keep dangerous and ineffective drugs off the market. Meanwhile, other patients have to sit and wait."

"And die," said Mira. "I know this drug works and it's safe—I was part of the team that researched it! But I could not get my child enrolled in a clinical trial—and even if I had, I would have worried that he would have been one of the controls who don't receive any medication! And I couldn't beg or steal enough of the drug from various labs to provide an adequate dosage. Believe me, I tried. It will take at least one year until the drug agency approves this drug. My child has less than six months. Do you know what it's like to watch him slowly waste away while the cure is available, but locked up? I was desperate."

"Most unpleasant," said Wrei. "But what were you hoping we could do? I seriously doubt we have any of this drug."

"But you could make them give it to me! You could tell those idiotic regulators that the drug works!"

Cecil shook his head and glanced at Bry. The misconception of omniscience.

"I see," said Bry. He and Wrei exchanged a long glance, and Cecil marveled at the dynamics of their facial fur. In those few seconds a great deal of information had been exchanged, silently and efficiently. "And were you unconcerned," said Bry, "that you were

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

spreading a deadly drug to my people?"

"But you don't have to take it in excess!" cried Mira. She waved her arm at Wrei. "I figured a doctor of all people would know how to regulate and dispense a drug. And make a lot of money, if he chose. You're not a bunch of children. You're more advanced than we are: you travel among the stars!"

"But the overpowering addiction—" began Cecil.

"—is not an illness, but a behavior!" cried Mira. "Look, I'm a doctor who specializes in pharmacology. I know a lot about drugs. I also know that most physicians talk about addiction as a disease. But it's not! I realize that for us humans there's a genetic component to addiction—some people inherit a susceptibility to drug abuse. But if addiction's a disease, then almost every other behavior is too. Addiction is a 'disease' that you can cure yourself—as many people have done by simply walking away from drugs. I'm sure that it's the same with the Zhaien as it is with us. How can a substance *force* you to consume it? Aren't we in control of our own behavior?"

"What about withdrawal symptoms?" asked Cecil. "I remember reading something about how dangerous they can be. Delirium tremens, for instance."

"In certain cases, when the body's tissues have been continuously saturated for a long time, you have to be careful. Yes, withdrawal symptoms can sometimes be dangerous and require medical supervision. But that doesn't mean you can't do it."

Bry and Wrei exchanged another long glance.

Cecil watched them closely. He felt like he partly understood the silent conversation, and if he read it correctly, he realized that there was hope that the Zhaien visit could be extended. But he had to act fast. "Perhaps," he said to the Zhaien, "we can be of mutual assistance with our respective problems."

"Perhaps," said Bry. "What did you have in mind?"

Cecil searched their faces. What did they show: Concern? Amusement? Indecision? No time to figure it out—just wade in, he thought. "If you will agree to help Mira with her dilemma, I'm sure she would be willing to help you better understand what windingweed does to you. If her ideas are correct, maybe you needn't be so frightened of it after all." Cecil was pleased that the word "frightened" seemed to have the desired effect: both of the Zhaien faces briefly displayed a touch of anger.

"But I'm not sure we can help Mira," said Wrei. "Our knowledge of your physiology is elementary."

"Maybe so." Cecil paused and smiled. "But I wasn't suggesting that you teach us about human medicine."

Bry's fur twisted synchronously. "Yes, I see your implied point, my friend. No doubt we could bring some small degree of pressure to bear on the right persons in your government. They want many things from us, do they not? We could encourage them to see Mira's unique problem, and perhaps they will relax their regulations in this particular case."

"They're pretty inflexible," warned Mira. "It'll be a real arm twist."

"But doable," said Cecil. "I would imagine the Zhaien could twist a few arms if need be."

"In exchange," said Wrei, "I want to hear more of your ideas. I just don't understand these addictions. Forgive my ignorance. Even I will admit that medical knowledge is not one of our people's strengths. Your scientists keep telling me about 'pleasure centers' in the brain and something called 'behavioral conditioning.'"

"Nothing wrong with those concepts," said Mira. "They're useful explanations—for some things. But I can't believe they mean we have no free will at all."

"I don't know if we do or not," said Cecil, "but sometimes it's best if you as-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sume that we do. I guess I may have forgotten that." He glanced at Bry. "How about it? Willing to give it a try?"

"I'm not sure. However, if windingweed can be beaten by the exercise of a little bit of free will, we needn't be—as you remarked, Cecil—so frightened of it."

"Maybe it's going to take a *lot* of will power," said Mira. A slight smile broke out on her face. "But I agree."

"And I believe that I'm almost ready to agree," said Bry. "But one more question: have any of your people simply walked away from heroin?"

"Actually," said Mira, "heroin may be a dangerous drug because of its effects, but it's not necessarily the most addictive drug on Earth. Not everyone gets hooked on any of the so-called drugs of abuse after trying them out—only a percentage of people become 'addicted.' Using that percentage as an index, you can rank the drugs according to how many users end up abusing them. It turns out that one of the most addictive drugs, maybe the *most* addictive, is tobacco."

Bry turned to Cecil. "Isn't that something you use?"

"Well . . . yes, but it's not very harmful, with the proper filters and de-toxifiers. . . ."

"Speaking as a doctor," said Mira—and Cecil noted that she was indeed speaking like a doctor, since confidence had returned to her voice—"there's no such thing as a completely safe cigarette. And nicotine, which is the active component of tobacco, is still very powerful."

"Is that true?" asked Wrei.

"I'm afraid I don't know," said Cecil. "I never tried to quit."

A moment of silence followed. Cecil suddenly felt cold.

"So," said Bry, "I believe that your original assertion, Cecil, was a correct one. A candidate solution to our difficulty has emerged. We will give education—and 'free will'—a try. It'll be your job to act as a consultant, Mira. Your job, Cecil, will be to give us confidence that willpower can be a sufficient armor."

Cecil coughed lightly. "You mean, by quitting. . . ."

"Exactly," said Bry. "As you've noted, and occasionally complained about, we are a conservative and cautious people. Claims must be demonstrated."

"I guess." Cecil grimaced. "How soon do I have to begin?"

"When did you last indulge?"

"About two hours ago."

Bry outstretched a large palm. "Then you began two hours ago."

Cecil dug into his pocket and handed over his cigarettes with only a slight hesitation. "It's a deal," he said, firmly but with a trace of nervousness. He looked at Mira. "I hope you know what you're talking about."

"I believe I do." She smiled. "We'll see."

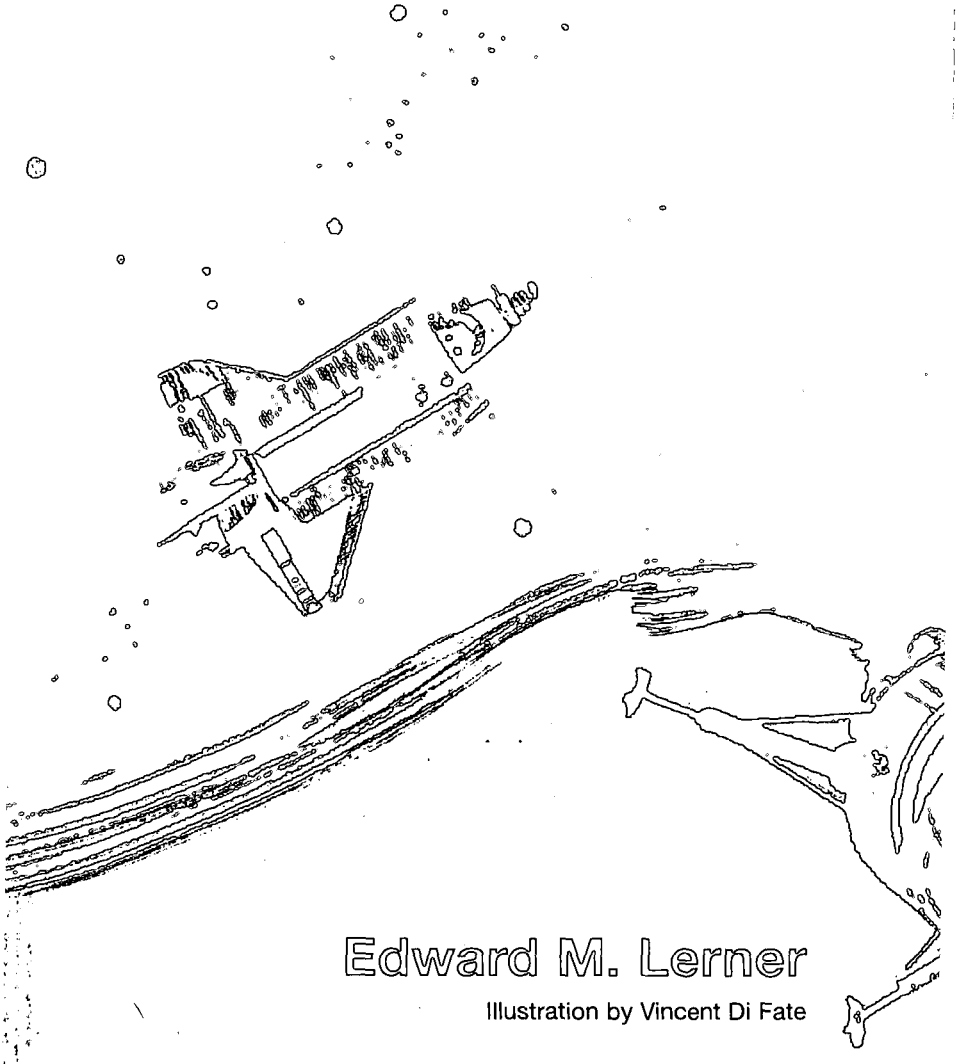
"But Cecil," said Bry, "is it not worth the risk?" ■

VISIT OUR WEBSITE
www.analogsf.com

Don't miss out on our lively forum, stimulating chats, controversial and informative articles, and classic stories.

Log on today!

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Edward M. Lerner

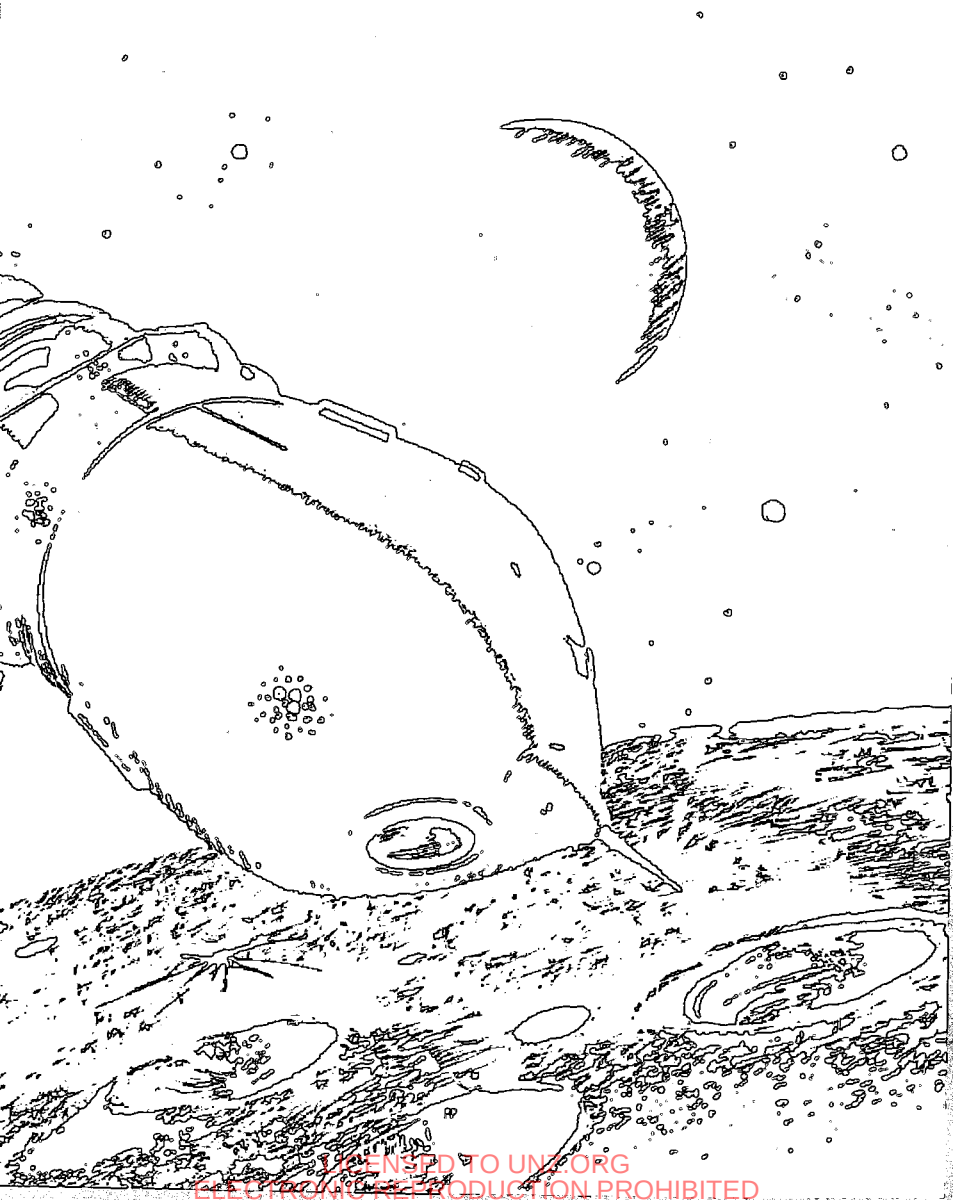
Illustration by Vincent Di Fate

"It ain't over till it's over . . ."
But how do you know when that is?

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

MOONSTRUCK

Conclusion



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Synopsis

The Moon has suddenly acquired its own satellite: a two-mile-across starship representing an unsuspected Galactic Commonwealth. The F'thk, a towering, vaguely centaur-like member species for whom Earth's ecology is hospitable, are evaluating humanity for prospective membership.

The F'thk are overtly friendly, but very private: "Information is a trade good." As Earth's scientists, led by presidential science advisor KYLE GUSTAFSON, struggle to understand their secretive appraisers, odd inconsistencies emerge. As troubling as those anomalies is the re-emergence of a bit of insanity humanity thought it had outgrown: Cold War and nuclear saber-rattling. The two extraordinary circumstances prove to be related: the F'thk are working behind the scenes to goad the United States and Russia into a nuclear war. No one knew why the secretly hostile aliens did not simply destroy the Earth directly. Until that question could be answered, the only "safe" course was to maintain the realistic appearance of a descent into Armageddon—and hope not to lose control. Key strategists in Earth's underground resistance are Kyle, presidential chief of staff BRITT ARLEDGE, deputy undersecretary of state DARLENE LYONS, CIA deputy director ERIN FITZHUGH and General RYAN BAUER.

SWELK, a social-scientist passenger on the Krulchukor starship Consensus, *is congenitally lame in one of three limbs. On a long interstellar passage, she had isolated unexpected radio signals, decoded them, and tracked them to an unknown intelligent species. The ship's captain, GRELBEN, was disinterested—every intelligent species known to the Krulirim had let its technology destroy them. To Swelk's surprise, fellow passenger RUALF convinced Grelben to detour. Upon reaching the humans' solar system, Swelk becomes more ostracized than ever. Through subterfuge, she determines that Rualf and his troupe are orchestrating Earth's nuclear self-destruction as the "special effects" centerpiece of an epic holofilm. F'thk are teleoperated robots and filming platforms. Swelk flees to Earth in a lifeboat to warn the humans, faking her death in a crash to cover her escape.*

The intimidating mothership in distant lunar orbit is shown to be a holographic deception. The aliens are lured into an ambush at a Washington, DC airport to film the touching—and wholly fictitious—delivery of Earth artifacts to the F'thk for safekeeping. The raid on the Consensus *goes horribly wrong. Amid chaos, Swelk eludes her human watchers, in the process dropping her computer (with its translation software). She boards the burning, fatally wounded starship, releasing her only friends on board—zoo animals—before plunging deeper into the ship. Most of the crew are dead.*

A bug Swelk long ago hid on the bridge of the Consensus *is in radio range of her dropped translator. Kyle and Darlene are helpless auditory witnesses to Swelk's death and Grelben's.*

But before Grelben dies, the captain is overheard to authorize the ominously named command file "Clean Slate."

CHAPTER 30

The garments and skin colors varied with the architectural backdrops, but the scenes were otherwise depressingly alike. Seething seas of humanity: fists shaking, faces contorted in anger, mouths agape in angry chanting. Desecrated flags—usually American, with a scattering of Russian. Hand-lettered signs—always in English—denouncing the two great nuclear powers. Uncle Sam in effigy, hung or aflame or trampled underfoot.

Why isn't anything Russian ever hung in effigy, wondered Harold Robeson. An effigy bear, maybe? Hal, isn't there something more productive you could

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

be thinking about?

There was a hesitant tap. His secretary was befuddled by his blowing off a long-scheduled confab with a key senator, for no apparent reason other than navel gazing. "Yes, Sheila."

A mass-of-black-curls head poked through a barely ajar door into the Oval Office. "Secretary McDowell to see you, sir."

Nathan McDowell, the secretary of state, was a short, pudgy fellow, his acne-scarred face dominated by a plug nose and a scruffy goatee. He evidently went out of his way to find ill-fitting suits, which he then had professionally rumpled. The contrast of his dishevelment with his ten-steps-ahead thinking could not have been starker. "Mr. President."

They were alone, *old* friends who'd met as Marine lieutenants in Nam. The formality was ominous. He pointed at a chair. "Take a load off. What's up, Nate?"

Ignoring the invitation, Nate studied the muted monitors. "Basking in the appreciation of our fellow citizens of Earth?"

"I never expect appreciation, but is holding down the stupidity so much to ask?"

"Not stupid, Hal, only ill-informed. Reacting to dashed hopes." His friend paused, hands clasped behind his back, watching the chanting mobs. "Do you know how many billion people on this Earth live in grinding poverty? How many have yet to use a phone?

"The arrival of the Galactics was a big deal to them." McDowell gestured at the screens. "In some ways, more than for the advanced countries. These people are taught—with some justification—to blame the major powers for colonialism and Cold War proxy wars, for the banking panics that periodically crush their economies, for global warming. The Galactics stood for *hope*. They promised new wonders for *Earth*. The poorest on our planet had the most to gain, while the envied, and sometimes hated, First World was revealed in its technological shortcomings.

"Now we and the Russians have taken all that away."

"What hope?" Robeson pounded what had once been Teddy Roosevelt's desk. "Dammit, Nate, the aliens were genocidal. We and the Russians, the ones being reviled in Cairo and Beijing, in Caracas and Lagos and wherever, we saved the world from megadeaths, to be followed by radioactive fallout and maybe nuclear winter. We suffered hundreds of casualties stopping it all."

"So we say." McDowell raised his hand. "Don't shoot the messenger. If you're a subsistence farmer or sweatshop worker in a Third World hell hole, would *you* believe aliens came from another star to meddle in human politics?"

"You think we should have revealed the aliens tried to destroy us for their movie?"

"Despite being the truth, that is even less believable. What's our evidence? Shot-up F'thk robots just prove the aliens were wise not to leave their ship in person. Swelk's debriefing videos? Since her responses came from a translator gadget, anyone skeptical will 'know' the tapes were dubbed." Nate shook his head. "How many Americans believe the Apollo landings were staged? No, the Krulirim first-level deception—that balance-of-power issues in their Galactic Commonwealth made Earth expendable—remains our best bet. There are lots of countries whose politicians were part of the F'thk whispering campaign."

"Do these fools think the *Atlantis* blew itself up, that our early-warning satellites spontaneously fried themselves? Why, in God's name, do they suppose we attacked the aliens?"

McDowell finally settled into a chair. "You *know* why, Hal, unpalatable as it sounds. For very good reasons, we and the Russians mock-waged Cold War II. For our gambit to succeed, that mutual hostility had to be believable—and it was. We have the casualties to prove it.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

You can't expect everyone to suddenly believe we were kidding.

"Details vary from version to version, but here's what most people, including Americans, think. The Twenty-Minute War was our misguided attempt to turn CW II hot. Radioactively hot. Benevolent aliens did their best to protect Earth from our folly, downing our missiles and slagging launching sites. In retaliation, or to disrupt the alien meddling, we killed the ETs we could reach. The other aliens, those aboard the Moon-orbiting mothership, left in disgust."

Robeson jammed his hands into his pockets—the president can't be seen plopping his head wearily into his cupped hands, not even by his oldest confidant. Too bad. "If the aliens are the heroes, what do the rioters think holds us back now? We have plenty of missiles left."

"They think," said McDowell, "we came momentarily to our senses. And that they'd better keep our minds focused." A muted screen changed scenes, from the humanity-filled Tiananmen Square to the besieged American embassy in Jakarta. "Or that the quasi-coup in Moscow cooled things down."

Robeson shivered. It had been *so* close. Dmitri Chernykov had failed in the first requirement of an officeholder: knowing how secure was his grip on power. He was supposed to have had another few days before the nationalists made their move. "Will their new coalition hold?"

"Nam was simpler, wasn't it?" McDowell was standing again, holding a Marine Corps-era snapshot of them he'd taken off a bookshelf. "Ending a firefight unshot and uncaptured meant things were fine." He put back the photo. "My Russia experts say the power-sharing pact *may* be stable. The nationalists in the coalition seem fervently to believe the credible disinformation about a shooting war. In their eyes, Chernykov is a hero for lobbing nukes at us. That said, near-immolation is a bit scary. They're content to let things simmer down. America, goes the current thinking, knows better now than to try pushing around Mother Russia."

"Meaning Chernykov must pretend belligerence. It keeps getting better." Robeson took a bottle of spring water from the well-concealed mini-refrigerator. "Something for you?"

"Got anything harder?" To Robeson's glance at a clock, Nate added, "It's late enough in London."

"What did the Brits do now? Don't tell me *they* don't accept the truth." Robeson splashed liquor into a glass. His reach for the water carafe drew a frown; he delivered the scotch neat. Something *bad* was coming.

"To paraphrase a former occupant of this office, it depends what your definition of 'accept' is. Recognize the validity of our data, yes. Believe what we say transpired, yes." McDowell took a long swallow. "Understand why they weren't party to the deliberations? Show willingness to come to terms with their exclusion? Not . . . a . . . chance."

Flashes of color outside the Oval Office window caught his eye. The first was his visiting three-year-old granddaughter, who had, she'd proclaimed at breakfast, dressed *herself*. He had to laugh. Brittany had on lime-green pants, a maroon-and-gray plaid shirt, and yellow sneakers. A broken kite dragged and bounced behind her. His daughter and two Secret Service agents tagged along. He tore his eyes away. "Go on, Nate."

"It's more than the Brits. France, Germany, Canada, Japan . . . pick your loyal ally. They're all outraged." Another swig. "As a diplomat, I understand. Not consulting a long-time partner is bad enough. They don't much like the explanation: we considered telling them what was really happening an unacceptable security risk. They can't handle that, for the best of reasons, I grant you, we flat-out *lied* to them." McDowell drained the glass. "*I* lied to them."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"No more than did I."

Nate stared into the empty tumbler, looking *old*. At long last he said, "The difference is, you were elected."

"No." The suggestion was too horrible to consider. "You're not resigning."

"Yes, I am. America's best friends have a real problem with us. We've lost credibility, and only something dramatic will show our contrition. They want proof of our remorse." McDowell poured a refill. "It's for the greater good."

"Your resignation is not accepted. I need your help, Nate."

"Then take it. My considered opinion is I'm expendable." McDowell waved at Brittany, skipping past the window again. "I have grandkids, too. You'll be doing me a favor."

"I didn't become president to sacrifice my friends." In meaningless symbolic atonement, Robeson's thoughts continued. At that instant, he truly *hated* his job.

"But you will." McDowell's smile was worldly wise, as if reading his mind. "I don't recall the Constitution making you the planet's guardian, either—but you are."

"Pour me a shot," Robeson said. They both knew that meant, "Yes."

The spring day was delightful. Only a few high clouds scudded across a blue sky. Flowering trees were in full bloom; the air was thick with pollen; the gentle breeze was warm. Elementary-school students streamed by, teachers and parental escorts shushing and herding.

Nuclear war and alien Armageddon alike seemed as unreal as snow.

"Great place," said Kyle. He sat beside Darlene on a bench at the National Zoo, the new Girillian habitat before them. That exhibit's popularity was in no way reduced by complete ignorance where Girillia *was*. The snaking queue of tourists extended well past the sign that read: three hours wait from this point. The adjacent Panda House, home of the zoo's famous Chinese great pandas, was for the first time in Kyle's knowledge without its own line.

"Lovely." Darlene brushed an errant lock of hair from her eyes. "Swelk would've approved."

Nearby, an elephant trumpeted. A swampbeast—almost certainly Smelly, Kyle thought—boisterously harrumphed back. Not a day had passed since the near-apocalypse at Reagan National that he did not think of Swelk, but visiting her charges here was especially wrenching. "I made a promise, the day we met. She was channel surfing at my house while I made arrangements for her. She asked to see elephants."

"It's not your fault, Kyle."

"She specifically sought my help. If not my fault, then whose?" As close as he and Dar had become in their grief, the silence stretched awkwardly. Kyle found himself studying the faint lunar crescent, scarcely visible in the day sky. "I don't know that Krulirim ever wear shoes, but I keeping waiting for a huge boot to drop."

"They're *gone*, Kyle. All gone. The hologram of the mothership disappeared—you *know* this—while . . . while the ship was burning. The satellites they left behind are inert."

He understood the catch in Dar's throat: she could as accurately have identified that instant as just before Swelk's death. Delta Force surveillance cameras had captured the brief appearance amid the flames of an antenna. Much analysis later, he knew the dish had been aimed at the Moon. *Something* had been transmitted: the mothership had vanished seconds later. "In a way, I wish we had been better able to hear those last exchanges on the bridge." And in a way, that would have made their helpless witnessing of Swelk's death yet more painful . . . even though it seemed she passed away entirely at peace. "Whatever the reason—the crackling flames, or Grelben and Swelk coughing from the smoke, or

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

overheating of the hidden computer through which we eavesdropped—so much that we heard was garbled, incomplete.

"What was in the file 'Clean Slate?' Steps to reverse however much of the damage they could? Or some sort of doomsday device?" Despite the balmy weather, he shivered.

"Kyle, you'll drive yourself crazy." She squeezed his hand. "Why don't we go see the girls?" Dar had adopted Swelk's kittens, now eight months old.

He squeezed back. "I'd like that." *And I like you*, though he wasn't prepared to explore that feeling. He didn't think she was quite ready either. But there would come a time. . . .

Strolling together to the subway station, Kyle tried hard not to stare up at the ghostly Moon. On that lifeless world, so central to the aliens' deceptions, he somehow knew Earth's future would be determined.

CHAPTER 31

"The legendary courtier Damocles is said to have reveled at a royal banquet, oblivious to the sword suspended above him by a single hair. Humanity, in celebrating its escape from the plot of hostile Krulirim, may be as recklessly unobservant as was Damocles. Like Damocles, extreme peril hangs, unnoticed, just over our heads and beyond our reach."

—excerpt from "The Continuing Danger from Krulchukor Artifacts" (Classified national-security briefing to the president)

The sword of Damocles was a later conceit. The comparison with which Kyle first vocalized his resurgent dread was less elegant, and far less flattering to his species.

Inch-thick salmon steaks, crusted with black pepper, sizzled on the grill. Mesquite smoke rose from a bed of perfect red-hot coals. Chirps and warbles filled the air. An ice dam collapsed in the chrome bucket in which a champagne bottle was chilling for the meal, the melting cubes settling with a lyrical tinkle into new positions.

If only things were as idyllic as they appeared.

"I like it." Britt's sweeping gaze encompassed the old fieldstone house, the rough-surfaced red-brick terrace framed in massive weathered timbers, the ranks of pine and mountain ash and dogwood in full flower that graced the nearby hillside. Kyle's other guests were at that moment hiking up that steep slope. "Very calming."

"Thanks, boss." Kyle expertly flipped the salmon as he tried to imagine a segue into what was bothering him. Darlene had succeeded, at his instigation, in drawing those other guests, the balance of the erstwhile crisis task force, from earshot. The more time he spent with her, the more glaring were his own rough edges. How would she—had she known—bring this up?

He needn't have worried.

"We've been colleagues how long?" Britt nibbled on a deviled egg. "This is my first time here. And, no offense, you're an every-silver-lining-has-a-cloud sort of guy . . . not to deny that your annoying pessimism all too often turns out to be annoying realism. In short, you're the last member of our merry band I'd expect to host a victory party. What is this *really* about?"

Still unsure how to begin, Kyle pondered the salmon sizzling on the grill. "It's like shooting fish in a barrel," he blurted. "And we're the fish." In plain English, that was the unnerving conclusion of weeks of confidential research.

Darlene, Erin Fitzhugh, and Ryan Bauer emerged into the clearing on the crest of nearby Krieger ridge. From where they stood, the burned-out site of Swelk's arrival remained evident. All recognizable fragments of the lifeboat had long ago been taken to the Franklin Ridge lab. Good job, Dar: they'd be away long enough to cover the basics.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Would you mind elucidating, Kyle?"

"The Krulchukor weapon platforms. They're orbiting over our heads, beyond our reach. They're quiescent, but we can't know what may set them off again." Now that the topic was broached, icy calm settled over him. He was as certain of this analysis as any work he'd ever done. "Ever ask Ryan about his fear of flying?"

"Care to pick up the pace? I imagine you arranged our friends' absence to speak alone with me. They'll surely be back for dinner soon."

Guilty as charged. "The masersats have been quiet since the destruction of the *Consensus*. We've taken that to mean the starship controlled them. No starship, no threat. But that was only inference. People at the lab have been poring over the records from that day. We can't interpret the radio signals from the *Consensus*, but there is no obvious time correlation between messages and maser blasts. We witnessed several smooth hand-offs of attack roles as Earth's rotation took some satellites out of line-of-sight of their targets. And we now know the masersats didn't all stop shooting at once." Kyle suppressed an irrelevant twinge of cognitive dissonance at calling the tactical transfers hand-offs. Krulirim did not exactly have hands.

"And this means?"

"It suggests that the satellites have autonomous capability. That worries me. And we can see from Swelk's translation program, and dealings with the F'thk robots, that Krulirim have better language-understanding software than humans. Natural language understanding is one of the largely unmet challenges of artificial-intelligence research. The observations all confirm Swelk's claims of widespread AI usage at home, technology far beyond anything we have."

A wind gust riffled Britt's hair as he thought. "Then why did the masersats stop firing? What would make them start again?"

"Now I'm drawing my own inferences. There might have been multiple causes for the halt. First, we were attacking the masersats as best we could. We probably damaged or destroyed a few. Meanwhile, and second, some masersats might just have hit all their preprogrammed targets. Before stopping, they'd already destroyed our and the Russians' experimental ground-based ABM/antisatellite laser facilities. They'd obliterated the International Space Station,"—thankfully abandoned since shortly after the *Atlantis* disaster—"and far too many other satellites. They'd nailed dozens of ICBMs in flight, missiles we'd retasked as antisatellite weapons, then fried the silos those rockets launched from." Kyle scowled in remembrance of the casualties.

"Point three. The masersats are solar-powered. Even one microwave blast uses lots of stored energy. Infrared observations during the assault suggest some masersats were temporarily drained. They would have had to recharge before they could fire again.

"The Krulirim didn't expect our ambush. My hypothesis is that the masersats were in an automatic self-defense mode. Once they hit all preprogrammed targets"—like, presumably, the innocent, sitting duck of a space station—"and once we stopped providing targets of opportunity by firing at *them*, there was nothing obvious left to shoot at. Who knows what activity, what overheard radio chatter, AIs on the satellites might interpret, or misinterpret, as threatening? Who's to say under what circumstances they can self-designate new targets?"

Kyle rushed on. "And we still don't know the meaning of 'Clean Slate.' Or what the Krulirim did on the Moon. We *must* go there. We have to—"

Britt's beer stein shattered on the patio. Kyle stared. His boss never lost his temper.

"No." Widened eyes revealed Britt's self-amazement. "Kyle, there are limits."

"But we don't. . . ."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"I said, 'No.' Do you honestly believe Nate McDowell wants to retire right now?" Do you understand what happens when a billion overseas consumers boycott American corn and fast food and computers and movies?"

Kyle's other guests crossed a glade halfway down the hill. Whatever he'd done wrong, he had to make amends. Quickly. He did a mental rewind. "A Moon program isn't affordable?"

"Not politically. Not economically." Kneeling, Britt began to collect bits of glass. "I apologize for my outburst."

"It's all right." But it wasn't. How dire were circumstances? *Take* something *when you can't have everything.* The advice that popped into his head could have come from Britt's years of mentoring, or Dar's more recent influence. It wasn't his normal approach to problems.

"Britt, excuse *me*. Forget I mentioned the Moon, and we'll get back to certainties. The aliens eavesdropped on us by satellite. Their software translated and interpreted what they overheard. And our most optimistic projections say we disabled fewer than half the masersats."

Erin, Ryan, and Darlene made known their imminent return in an outburst of laughter. Erin Fitzhugh roared the loudest, no doubt relishing her own raunchy joke. A grinning Ryan Bauer followed her from the woods, waggling the beer emptied during the brief hike. Darlene appeared last, looking sheepish.

"Enjoy your meals, folks." Britt straightened, a cupped hand holding a carefully arranged mound of glass shards. His confident manner belied his earlier, unwonted anger. "It looks like we have work yet ahead of us."

Darlene blushed at another peal of laughter, as Britt, Ryan, and Erin made their ways to their cars. She made a production of dumping paper plates and plastic utensils into the trash—it kept her back to the hall from which Kyle, having escorted the others, would reappear. As she dawdled, crunching gravel marked the departure of vehicles.

"Thanks again for the help." Kyle had stopped in the doorway. "For the side dishes *and* getting me time alone with Britt."

Damn that Erin Fitzhugh. Darlene began scraping serving bowls. "My pleasure."

"Leave those. That's above and beyond the call of duty. You've got a long drive, too."

She puttered a little longer at the sink, until she felt her face was no longer red. Frantic scratching at the patio door gave her a good excuse to turn. She'd brought the kittens for the day. "Mind if I let in Blackie?" Stripes was already ramming around inside.

"Sure." Pregnant pause. "On the back forty before dinner . . . why all the cackling?"

She was a trained diplomat, and she could surely spin, digress, or weasel her way out of any admission. But this wasn't work; maybe she'd play it straight. Wiping damp hands on her jeans, she swiveled to face him. "How shall I put this? Erin speculated somewhat colorfully about the . . . closeness . . . of our friendship."

"I can imagine how delicately she made the suggestion." Kyle grimaced. "If you don't mind my asking, Dar, what was your response?"

She hadn't dignified Fitzhugh's gibe with an answer. Darlene crouched to scratch Blackie between the ears. The kitten was a gangly teenager now. Swelk loved the cats—and she'd never see them grow up. Darlene fought back tears.

Life was too short to always play it safe. They kept skirting the edge of a deeper relationship, and then shying away. As Erin would have said: screw this. "I defended your virtue."

"Ouch! You sure know how to hurt a guy."

Saying nothing is an old ploy for making the other person say more. She said

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

nothing for a long time. The Moon peeked over the ridge, cool silver light streaming through the patio doors.

"And you said nothing I didn't deserve." He crossed the room and kissed her. "The Moon is beautiful tonight. Let's sit outside for a while."

CHAPTER 32

In his heart of hearts, the campaign that began at Kyle's barbecue was Project Swelk. Not only, he liked to think, would his friend have approved, the private name also befit the plan having three stages. The plan's final part, however, was something best unarticulated . . . at least for now. His reticence left unchallenged Ryan Bauer's proposed code name: Project Clear Skies.

Today was a big day in the execution of Phase One.

Kyle sensed the weight of the mountain, deep within whose bowels the command center was burrowed. It wasn't claustrophobia, which had never afflicted him. No, his awareness of the vast bulk of Cheyenne Mountain manifested itself in feelings of safety. Easily a billion tons of rock separated him from the masersats—reassuring despite his conviction that today's activities could draw no hostile attention here. The imagery he so eagerly awaited was being collected by passive sensors scattered around the globe. Much of the comm link from each telescope and instrument to these underground warrens traversed buried, military-use only—which was to say, supposedly untrackable and unhackable—optical fibers.

If you're so confident, Kyle, why is that gigaton of shielding overhead so comforting?

He was in a VIP viewing area, whose glass front formed the top half of the rear wall of the space control center. Fingering his tie nervously—he was in a suit; his three companions were Air Force officers, and in uniform—Kyle scanned the tiers of workstations below, and the men and women laboring intently at their terminals. An enormous, flat-screen display dominated the front of the control center. The screen showed a world map, overlaid with the ground tracks of orbits of interest. Bright spots on the ground tracks marked the current positions of specific satellites. All but one orbit shown was for alien weapons platforms. The side walls held lesser, but still impressively large, displays. Those were currently blank.

Space Control, one of six major operations in the NORAD complex, kept tabs on everything in near-Earth space. Satellites operational and otherwise, spent upper stages of rockets that had launched those satellites—and debris from rockets that had exploded in the attempt, tools dropped on manned orbital missions . . . all in all, there were thousands of objects to be watched. NORAD did not reveal just how small an item it could detect, but they did, from time to time, warn NASA and commercial satellite owners to tweak a mission's orbit because a bit of space junk would otherwise pose a hazard.

There was an intercom button in the frame retaining the wall of glass. Bethany Johnson, the brigadier general commanding the 21st Space Wing, with responsibilities including Cheyenne Mountain Air Force Station, pressed it. "Five minutes. Look sharp, people." She was a wiry black woman of average height, with wide-set eyes behind wire-rimmed glasses. Johnson had none of Bauer's ex-pilot, good-ole-boy swagger; she'd risen through Air Force ranks on the unglamorous logistical side until Space Command began offering operational opportunities to women. Her demeanor conveyed endless determination. Releasing the button, she turned to Kyle and Ryan Bauer, her guests. "Any requests for the auxiliary screens?"

"Can you project our wayward satellite and the target?" Kyle asked.

"Absolutely, optically and in pseudocolored IR view. No radar, of course . . . by your rules. We wouldn't want to risk your

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

AIs, should they be real, knowing we're watching." This *particular* masersat was visible to radar, although it hadn't been before the Twenty-Minute War. That this bird appeared on radar was one more reason to believe it was out of commission. Johnson nodded to her aide, who whispered urgently into his headset mike.

The side screens came alive. On Kyle's right appeared an unmanned spacecraft of obvious human design: gold foil-covered (except for its solar-cell wing) and boxy, with nozzles and instruments and antennas jutting in all directions. The telescopic image was blurry, details lost to atmospheric shimmer. A picture-in-picture shot rendered the same satellite as imaged by infrared sensors. The computer-generated colors were indicative of incident sunlight absorbed by the satellite and reradiated, and of heat generated and emitted by internal operations. The satellite jittered and tumbled, the flames from random firings of attitude jets unmistakable in the IR view. Only in close-up were the tumbling and corkscrewing motions visible; at the coarse resolution of the front screen, the satellite's blue track was arrow-straight.

"Thanks," said Kyle. The left screen showed another spacecraft, whose flowing curves screamed of an alien origin. The hull had paired bulbous sections, suggesting the segmented body of an insect. The sections struck him as subtly mismatched, as though dissimilar machines had been fused. Whether that perception had any validity, he couldn't begin to guess. But forget guessing—the operation culminating today was part of a systematic process. In due course, if all went according to plan, an artifact like this would become available for dissection.

And Captain Grelben's plans? If Kyle had miscalculated, today's actions would trigger dormant Krulchukor AIs. The *Atlantis* fireball came unbidden to his mind's eye. Packed jumbo jets were as vulnerable to masers. Was it wiser to let sleeping weapons of mass destruction lie?

The Krulchukor satellite also tumbled slowly. Its wings, presumed power-generating solar panels, met the hull at quite different angles. "The masersats don't all look bent, do they?"

"Only a few are asymmetric; the irregularities that do occur all differ," said Ryan. "Best guess is it's battle damage. The laser probably wasn't on one spot long enough to sever a strut, just to soften it. And check out the IR view, how the bent wing's surface radiates heat so unevenly. I'm guessing our Russian buddies melted some solar cells."

That would be before another alien satellite slagged the Russian ground-based ABM laser. They were rehashing familiar facts, running out the clock. Kyle's stomach churned. His head swiveled from image to image: target and probe.

"Colonel," said Johnson to her aide. "Three minutes to closest approach. Would you do a synopsis for our guests?"

"Yes, sir!" Arnold Kim, a Korean-American with close-cropped gray hair, towered over his commanding officer. "General Bauer, Dr. Gustafson, we'll start on the main screen. You see seven parallel tracks, running pole to pole." On the display, those tracks tipped about twelve degrees to the north-south axis—the effect on the ground track of Earth's rotation. "Each orbit has three enemy satellites, equally spaced, appearing on their track as colored dots. The orbits are also evenly separated; that's one every fifty-one and change degrees of longitude. All twenty-one satellites circle at the same altitude, about 2,300 miles. Every spot on Earth is in sight of several weapon platforms at all times."

The scenario was familiar: VIPs visit from Washington, and the attention-starved assistant belabors the obvious. Killing time was one thing; missing the action—even though everything was being captured for replay—was another.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The translucent timer superimposed over Antarctica decremented below two minutes. "I've got it, Colonel. Green dots for satellites believed to be disabled, like that one." Kyle pointed. "Red dots for enemy satellites thought still to be dangerous." As the next encounter will be . . . if we get that far. "Yellow for the birds we're unsure of. That includes the three that have never been seen to fire, presumed defective."

"Yes, sir." The tone conveyed disappointment at thunder stolen.

Ryan Bauer glowered disapprovingly at Kyle. Too brusque, interpreted Kyle. By way of amends, he tossed out a question for which he needed no answer—and for which the reply should be brief. "But the blue track, Colonel, on the intersecting path across the alien orbits?"

"Our innocent, helpless visitor, sir."

"Sixty seconds." The advisory came over the intercom, presumably from someone in the control room beneath.

Kim whispered again into his mike. Sensors monitoring the satellites panned back; the spacecraft now appeared together in the side displays. Both spacecraft tumbled, the boxy one also jittering about seemingly at random. It defied mere human abilities to extrapolate whether a collision would occur—although, on the world map, the blue and green dots had merged. A text window popped up in a corner of the close-up, the value thus revealed dancing up and down without leaving the vicinity of 90 percent. The inset infrared view of the alien craft stayed cool—there was no sign of masers preparing to fire.

"Thirty seconds." The numbers continued to bounce, but the trend towards 1.000—certain collision—was unmistakable. "Twenty seconds . . . fifteen . . . ten."

The human satellite zigged once more, impelled by yet another seemingly random firing of an attitude jet. The spacecraft suddenly diverged; the numbers dropped in a blur towards zero. To whistles and claps and cheers of approval, in the viewing gallery above and the control room below, blue and green dots on the big screen separated.

Kyle extended a hand in congratulations to their relieved-looking host. "Well done, General."

How many alien weapons still functioned? Were those that had survived potentially hostile? What might induce an attack? Without answers, it was impossible to know whether the Krulirim were, from beyond the grave, still capable of trapping mankind on Earth. Space missions that had come to seem routine could now provoke truly frightening retribution. From the *Atlantis* explosion to the destruction of underground missile silos, the dangers of a space-based siege were all too apparent.

Today's maneuver had probed one of the masersats whose behavior had changed since the Twenty-Minute War. It tumbled along its path, where before it had maintained an orientation towards Earth. Its looping course was slowly deviating from the orbit it had once precisely shared with two other alien satellites—unlike those neighbors, it no longer performed the occasional maneuvers that would compensate for the perturbations from solar wind, lunar drag, and slight irregularities in the Earth's mass distribution. Its presumed solar wings no longer pivoted to track the Sun, sharply diminishing the amount of solar power it could be accumulating. Observed by ground-based infrared sensors, it exhibited far less variability in heat distribution than most other alien satellites. And it had lost its one-time invisibility to radar.

If this satellite was, in fact, irreparably damaged, it ought not to respond to a flyby. With luck, none of the undamaged masersats would notice a flyby of this derelict, or if they did notice, consider the close encounter reason to react. The challenge, when the stimulus most likely to provoke an automated attack was a missile launch, was to somehow approach their prey.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Kyle's insight had been that launch would be avoided, if (and it was a big if) an already on-station spacecraft could be repurposed. With Ryan Bauer's ungentle prodding, Space Command offered a spysat. It was higher than most surveillance platforms, put there to test technology for observations from heights unreachable by the primitive missiles of rogue states.

The earthly concern that had motivated the expensive orbiting test bed now seemed quaint.

The spysat had been launched scant months before the arrival of the *Consensus*, with fuel for a five-year mission. It was owned by the National Reconnaissance Office, the super-secret agency whose very existence remained classified throughout the Cold War. No doubt not having paid for the satellite made it easier for Space Command to offer it up.

Kyle's scheme involved far more maneuvering than the NRO's mission planners had had in mind—but he didn't object to spending onboard fuel profligately. What mattered was that the spysat's orbit was about right, that its instrument suite included an IR sensor, and that the manufacturer had a good simulation program for modeling the satellite's response to engine burns.

The wide separation between masersats gave ample opportunities to send signals, without fear of detection, to human-built satellites. Soon after Kyle's barbecue, a new navigation program was beamed to the spysat. Two days later, the satellite's attitude jets began firing erratically. Fuel sufficient for eighteen months' normal orbit-tweaking was burnt in seconds, sending the spacecraft tumbling wildly and slightly raising the apogee of its orbit. From time to time, its onboard controls seemed to have some success in regaining stability, in reorienting the solar panel so that the batteries could be recharged—and then the sporadic engine firings would resume.

The episodic engine burns, however unconventional, were not random—but, it was hoped, observant AIs would infer equipment failure from the satellite's haphazard course. Eighty-six and a fraction orbits later, the wobbling satellite, its fuel half gone, had barely missed a Krulchukor satellite showing every appearance of inoperability.

"Phil Davis here is the wizard who coded the navigation program." The gangly lieutenant was one of the officers Gen. Johnson invited to the viewing gallery after the rendezvous had passed safely. His blue eyes, beneath a single caterpillar-like brow, darted about the room.

"Excellent job, Lieutenant." Kyle gestured at the side display still showing the initial target. The human spysat had receded from this view. "Brilliant programming." Praise only made the young man's nervous ocular motions increase. Kyle sighed inwardly: his words were sincere. "Did you have any questions, Lieutenant?"

Davis glanced at his feet. His scuffed shoes, however unmilitary, evidently instilled confidence. "Yes, Dr. Gustafson. I was given a navigation problem to solve, under rather odd constraints. What, exactly, were we hoping to accomplish?"

Short, and to the point. "We were gathering data. Your calculations,"—Kyle had in mind the probability estimate that had briefly overlaid the scene—"showed a very high likelihood our wobbly bird would impact the alien craft. If a functional AI were watching, don't you think it would've gotten the masersat out of the way before our last-moment zig?"

Cocking his head, Davis considered the alien craft. "A working AI *and* control of its own propulsion. It's much the worse for wear."

"I concede that ambiguity, but the larger conclusion is unchanged. In the Twenty-Minute War, we clobbered this thing enough that it can't defend itself. That raises my confidence about other masersats we thought disabled."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

There was a soft knock, a pause, and the door swung part way open. A steward backed in, tugging a squeaky-wheeled cart laden with soda cans, bottled water, an ice bucket, and a cookie platter. He left as unceremoniously as he'd entered.

"Healthier than my usual celebratory libations. Thanks, I guess." Bauer grabbed a Coke. "So, Lieutenant. Will the next bit go as smoothly?"

The attention of two generals and a presidential advisor, plus, for all the junior officer knew, the fate of human civilization on his narrow shoulders . . . Davis broke into a sweat. A quaver in his voice, he pointed at the main screen. The timer still floating over Antarctica decremented towards the next mission milestone. "Thirty minutes, sir, and we'll know."

The commandeered NRO satellite continued its seemingly random attitude-jet firings. Pitch, yaw, and roll slowed dramatically, without altogether stopping. With no obvious indication of being under control, it reduced its tumbling enough for on-board sensors to reestablish with precision its orientation and position. Every few seconds it took a fresh IR reading of a remote patch of the southern Pacific.

The satellite likewise gave no overt indication when the message for which it waited was received. It was scanning for a large fire, unmistakable to its infrared sensor. The nonexistence of that oil-slick blaze was unambiguous—and an absence could not be correlated by a hostile AI with subsequent events. The non-recall authorized the spysat to execute the next routine in its uploaded navigational program: rendezvous with a second orbiting alien artifact.

The new target was armed and presumed extremely dangerous.

Through the fiber-linked, surreptitious eye of a telescope far from Cheyenne Mountain, the hurtling spysat was seen to perform a series of brief attitude-jet firings. Pitch, yaw, and roll largely damped out. The men and woman in the VIP viewing room, all spectators at this point, stared at the wavy, grainy image. The main parabolic antenna on the spacecraft spun three times around its mounting post.

Three rotations meant: target acquired.

"Well done, again, Lieutenant." Bauer slapped the embarrassed young man on the back.

"Now it gets interesting." Kyle studied a side screen. This masersat's wings looked identical; both were tipped to catch the maximum sunlight. In the infrared view, stripes on the spacecraft rippled and flowed, like a beast languorously flexing its muscles.

The spysat on his left had resumed its manic tumbling. Infrared revealed more seemingly ineffectual engine firings. Sensors caught a flurry of heat bursts, longer at first, and then trailing off to sputtering. In the end, the solar panel pointed straight down to Earth, 2,300 miles below. It sure looked, thought Kyle, as though the probe halted its spin with the dregs of its fuel. Here's hoping any AI on the target agrees. In truth, the tanks remained one-third full.

The countdown timer on the map display forecast rendezvous in six minutes.

"What's next, Lieutenant?" Bauer perched on the edge of the viewing room's oak table.

Davis gulped. "More waiting."

A red spot bloomed on the masersat's IR image, and the estimated collision probability plummeted. "That hot spot's no maser," said Bauer. "What happened?"

"It's moving," answered Kyle. "Now to answer the big question: was it sidestepping a suspect visitor? Or was it a coincidence, an ordinary orbit-maintenance maneuver?"

The spysat they did not dare to radio so near to its target obeyed its programming—and the absence of an at-sea fiery

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

abort signal. Its engines sputtered anew, and its path changed. The collision probability climbed. The two craft came close enough to be viewed on the same screen.

On the spysat, fuel pumps toiled. Safety interlocks in the original software had been overwritten from the ground, allowing pressure to mount behind closed fuel-line valves. Other unorthodox reprogramming had retracted the heat-dumping radiator panels. Streaming sunlight, unfiltered by atmosphere, drove heat into the seemingly crippled satellite. Heat seeping into the fuel tanks raised the temperature of the contents, and the pressure of the vapors within.

The masersat pivoted toward the approaching spacecraft. Reddening of the IR image revealed waste heat from torrents of power being routed. "Weapon charging." Kyle spoke more to unclench his teeth than in expectations of conveying information. "*Something* on board learns fast . . . maneuvering once didn't help, so it's preparing more active measures."

"Funny thing." Ryan's eyes gleamed. "We can learn, too."

The spysat's earthward-hanging solar panel served as an impromptu anchor, the gravity gradient holding steady the satellite's orientation. Solar heat continued to flood in. When fuel-tank pressures exceeded a preset level, the onboard computer opened the valves.

Over-pressurized fuels gushed into the attitude jets' combustion chambers. No spark was needed—monomethyl hydrazine and nitrogen tetroxide ignite on contact. In such over-spec quantities, that ignition was spectacular indeed. A fireball erupted, its IR image painfully bright. (This bang is *our* doing!, thought Kyle. See how you like it.) The explosion turned the NRO's expensive satellite into tons of shrapnel.

IR sensors flared. Fragments blazed as they were blasted by the maser. But too many pieces were headed toward the masersat, from too close. . . .

The Krulchukor satellite twitched as the wave of debris struck. Holes gaped in the solar panels and hull. The IR view flashed and sparkled, as metallic shards shorted out circuitry. Then the whole room flashed crimson—the catastrophic discharge inside the masersat of stored energy meant to be pumped out through the masers.

When tearing eyes could again focus, *no* satellites were on-screen.

Kyle steadied himself against a wall. His heart pounded. The only change to the situational map was two dots removed. No alarms meant no retaliatory strikes. "The bad news is, we've confirmed the masersats have the capacity to act independently."

"The good news is, we can still, at least sometimes, out-think them."

Eighty-seven days later, a barrage of reprogrammed ballistic missiles, launched in a synchronized attack from safely submerged American boomers, overwhelmed the eleven Krulchukor satellites thought most likely still to be functional. The other ten remained gratifyingly inert.

In condemnation of American unilateralism, sixteen nations and the European Union recalled their ambassadors to Washington. Overseas corporations, bowing to public outrage, cancelled high-profile orders for American passenger jets, oil platforms and pipelines, pharmaceuticals, and supercomputers. The immediate human toll: another eighty thousand badly needed jobs.

As a longer-term consequence of the Second Twenty-Minute War, the space control center at Cheyenne Mountain started tracking thousands more bits of orbiting space junk.

CHAPTER 33

The helicopter *thp-thp-thpped* its way across the Los Padres National Forest. The heavily wooded park was lush and green, the jagged gash of the San Andreas fault unmistakable as the chopper

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

raced over it. Spectacular scenery and engine roar alike conspired to preempt conversation. The burly, ruddy faced pilot, in any case, wasn't terribly talkative.

Kyle peered past his reflection at the countryside sliding by beneath. The trip from Los Angeles to Vandenberg Air Force Base was, as the crow rolled the flat tire, roughly 150 miles. The view from the aptly designated scenic highway would have been superb. In a simpler world, he would have loved to have driven, Dar beside him, sharing breathtaking vistas of coastal mountains and rocky shore.

Of course, in a simpler world, a mission this dangerous would never have been conceived.

While he yearned for the impossible, he could hope that the roads to VAFB not be clogged by misinformed protesters, nor half the world's weather disrupted by El Niño. The same climatological phenomenon that kept this forest so verdant had his wife leading a State Department delegation from Indonesian drought zones to Peruvian flood plains. The squall line barely visible to the west, far out over the Pacific, might or might not be another manifestation of El Niño. Would weather delay today's launch? Obstruction by natural causes seemed *so* unfair. Wasn't it enough to face the technological superiority of the Krulirim?

The taciturn Air Force captain flying Kyle over the protesters pointed at something to the south. One of the Channel Islands? A ship? A noncommittal answering grunt seemed to satisfy her. It was just as well Kyle wasn't driving; the scenery had already lost his attention. He could not keep his mind off his problems.

The *world's* problems, Dar would have insisted, not *his*. The point of semantics made not a whit of difference. For five years, Kyle's had been a lonely voice, often the *only* voice, championing today's mission. For five years, he'd kept all doubts to himself—there were enough advocates for inaction. For five years, he'd awakened each day wondering if this were the day a growing deficit, or international hostility, or political expediency finally overwhelmed his tenacity.

And for five years after the fiery destruction of the *Consensus*, the flotilla of alien satellites circled overhead. Had they been a part of Clean Slate? In theory they had been neutralized . . .

As the helicopter began its final descent to the VAFB airfield, Kyle again rephrased his thoughts. After five years of preparations, he was about to test theory with six people's lives.

Tantalizingly just beyond humanity's reach circled three failed-in-orbit masersats. These inert satellites had gone untargeted in both Twenty-Minute Wars. The first time, that omission had reflected expediency—more obviously dangerous targets had drawn Earth's fire. By the second conflict, leaving alone these three satellites was a matter of strategic calculation.

Phase Two of Clear Skies aimed to retrieve one of those nearly intact artifacts.

A space shuttle could take a masersat on board—if it could climb far above its 400-mile altitude limit, and if it could achieve polar orbit. Two extraordinarily *big* ifs. Raising the shuttle's altitude meant refueling it in orbit. Refueling meant somehow lofting large amounts of fuel into space in a vessel with which the shuttle could mate. Flight-testing a large-capacity space tanker could hardly be done in secret.

Nor could the preparations be hidden for a new shuttle launch site. Populated regions north and south of Florida precluded initiating polar missions from Cape Canaveral. Another coastal location was required. Somewhere, should the worst again happen, with ample empty ocean to its south. Someplace like Point Arguella, California—which, not coincidentally, lay within the borders of Vandenberg AFB.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

All this activity by a reinvigorated American space program—and involving a launch site within a military base—was anathema to the international community. In a world that believed—or, as in Russia's case, where *Realpolitik* favored pretending to believe—that benevolent aliens had left behind orbiting guardians, renewed astronautical ambitions by the slayers of those masersats were intolerable.

But protests, worldwide boycotts, and the grinding recession notwithstanding, after five arduous years of preparation, it was finally time to execute Phase Two.

When, finally, the weather held and the Navy drove a flotilla of sea-going protesters from the restricted seas off Point Arguella, when at last the first manned mission ever to launch from Vandenberg AFB rose on a bone jarring, ear-shattering, column of fire . . . it was tremendously, awe-inspiringly, and blessedly anticlimactic. Kyle exited the massively blast-proofed Launch Control Center as soon as it was safe, gazing southward until the last faint speck of a spark disappeared. The contrail twisted and tore as the winds along its length assailed it.

"Way to go, *Endeavor!*" Ryan Bauer gave Kyle a congratulatory slug in the shoulder. The general had become a fixture at Space Launch Complex Six (SLC-6, Slick Six to the locals). "I can't tell you how good that feels."

Kyle couldn't argue. But still. . . . "That was the easy part."

"What is it Britt says about you? Every silver lining has a cloud."

"I should have been onboard! I could have been. Plenty of payload specialists have been shuttle-trained in two months—I could have afforded that." But the president had nixed it, for "national security" reasons. *Damn* it.

"What payload would you have overseen, besides a stomach full of butterflies?"

"A head full of insight about Krulirim." A seagull fluttered to a landing by Kyle's feet. "How many of the crew have that background?"

"None—which is why you're *here*. Should this mission fail, we'll need more than ever what's in your head." Bauer grabbed Kyle's arm, turning him until their eyes met. "Leading isn't always done from the front. Trust me: I know what it's like to order others into battle."

"Hopefully, it won't come to battle." Kyle swallowed hard. "But there's plenty of risk even if the masersats stay dormant."

The cabin cruiser bounced and shuddered, bludgeoning a path through high seas. Darlene for the umpteenth time patted her sleeve. The Dramamine patch was still on her arm, and still unequal to the task. With each wave crested, the boat and her stomach fell out from under her, to return an instant later with a bone-jarring impact. The worst of the storm, supposedly, was now pummeling Mexico.

"I said," yelled Roone Astley, the ambassador to Costa Rica, "the weather is much better." It was his boat, and he stood with maddening assurance on what Darlene considered a bucking deck. He motioned to starboard. "The sky is getting lighter."

Another lurch of the boat sent her reeling. Astley caught her before she fell. The bite of breakfast she'd foolish taken rose threateningly in her gorge. Yes, the sky was brighter, which only made more horrifying the view of the shoreline they were paralleling. The tropical downpour whose trailing edge continued to lash the boat had stalled for three days over the narrow Pacific coastal strip. The rain-saturated mountainside had come rumbling down in two.

They were nearing one more village washed away by mudslide. Except for the occasional stone chimney, nothing but snapped tree trunks at odd angles emerged from the muck. Pounding

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

waves had churned the encroaching mud into an enormous stain stretching hundreds of yards into the ocean. Objects that thankfully could not always be identified bobbed in the darkened sea. Many were corpses, already bloating from decomposition. It was hard to imagine anyone surviving the disaster. With the houses buried, she couldn't begin to guess what the population had been. Hundreds, surely. And they'd passed a dozen such tragedies already. "This is horrible," she said. "You know I have emergency funds to release. What else can the U.S. do?"

Astley paused for a staticky announcement from the marine radio before answering. "What the Costa Ricans urgently need is emergency supplies and logistical support. They're getting some from the EU and Japan. I doubt they'll take such visible aid from us."

The hull slammed into another wave trough. Darlene staggered. "Another government still officially enraged at us? Have we made *no* progress?"

"We're still the murderers who drove away the Galactics, and with them the secret of free fusion power." He throttled back briefly, for reasons she was too landlubberly to understand. "They'll take our money, of course, if we give it privately."

The worst thing was, this immense, slow-moving tropical depression wasn't an isolated event. This year's El Niño was the worst in years. As America's goodwill ambassador, she'd been traveling from catastrophe to catastrophe for weeks. Drought and uncontrollable forest fires in the western Pacific, storms in the eastern. How had her country fallen so low in the world's esteem that accepting American disaster relief was an embarrassment? And knowing what she did about the aliens . . . the rage against the US was *so* unjust.

The Krulirim! Her watch confirmed a belated, jet-lagged recollection of the date. Today was Kyle's big launch. Guiltily, she wondered how the end of Clear Skies was going.

NASA practice for the shuttle was to separate the orbiter from its external tank when the pairing reached 97 percent of orbital velocity. In a fuel-wasting maneuver, the manned orbiter aimed its tank, just before that decoupling, for a dramatic splashdown in the Indian Ocean. The logic was to safely dispose of the tank rather than have them accumulate in orbit.

This was an Air Force mission, and the start of a new practice. The now nearly empty tank stayed with the orbiter all the way into a circular orbit at an altitude of 150 miles.

"Target on visual," drawled Maj. Tara "Windy" McNeilly, the *Endeavor*'s laconic pilot. Closed-circuit TV gave the ground team a pilot-eye view of the dart-like fuel carrier being overtaken by the orbiter. The waiting tanker—basically an unmanned and stripped orbiter replete with fuel—had been launched from Slick Six weeks earlier. It had been parked in a higher orbit until needed, then lowered in preparation for *Endeavor*'s launch. "Ten klicks."

In simpler times, the first manned launch from Vandenberg and the first shuttle to carry its ET into orbit would have been enough experimentation for one flight. For today's mission, the novelty had just begun. Minute by minute, hour by hour, tension built. The spacewalk to attach radio-controlled attitude jets to *Endeavor*'s about-to-be-jettisoned external tank. (Built-in thrusters would have required extensive ET modifications and unmanned shuttle test flights—time Kyle was reluctant to spend.) Remotely piloting the tanker to *Endeavor*'s now-separated ET. Docking, refueling, and undocking—and repeating that dangerous maneuver until it was routine. Rendezvousing again with the partially refilled ET (no human spacecraft could carry a full ET's worth of liquid hydrogen and liquid oxygen into orbit). Mating *Endeavor* with its refueled

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ET . . . remembering throughout how the botched docking of a much smaller resupply capsule had almost killed everyone aboard the late, lamented Russian *Mir*.

"Piece of cake," said McNeilly as she completed the final docking. She unbuckled and floated free in the small cabin, making micro-gravity bows. Colonel Craig "Tricky" Carlisle, her restrained mission commander, waited until the disconnect valves in both orbiter and ET reopened before flashing thumbs up. A mid-deck camera showed four more beaming faces.

The expressions in mission control were equally happy. Kyle found an unused mike, then shot a questioning look at the capsule communicator, who nodded her go-ahead. "I suggest you folks get some sleep. Your next stop is going to be really interesting."

Two astronauts floated free, the orbiter having backed off to a distance that made tethers impractical. Puffs of compressed gas from the backmounted MMUs, manned maneuvering units, nudged them closer and closer to their quarry. The black, vaguely insectile masersat absorbed most of the illumination from their helmet-mounted lights.

"It's as we expected," said Maj. Anson "Big Al" Buckley. "The wings are covered in a repeating pattern, a grid of squares connected by fine lines. It sure looks like a solar-cell array."

"Agreed." Major Juanita Gonzalez, a woman of few words, was cursed with the unavoidable astronaut-corps nickname of Speedy.

Thousands of miles away, Kyle overcame the urge to scream with impatience. Solar cells weren't today's issue. "Can you fold the wings?" CAPCOM relayed the question. The masersats could not have exited the cargo-bay airlocks of the *Consensus* unless the struts folded—nor could one fit aboard *Endeavor* with its wings extended.

"Negative on that. No visible hinges, buttons, switches, or cranks." On the telephoto view broadcast from the *Endeavor*, only a tiny gap appeared between Buckley and the satellite. From the camera's frame of reference, the astronaut was floating on his head.

"I'm stumped," admitted Gonzalez. "I'm clueless how the twenty-seven-toed buggers fold the wings."

The spacewalkers tried a few tentative pushes and shoves, to no avail; the wings did not budge. "Okay, propose we go to Plan B."

CAPCOM looked to Kyle and Ryan Bauer for approval. Kyle triple-checked the IR view of the screen. Just solar heating, as far as he could tell. He nodded. "Roger that, Speedy."

On *Endeavor*'s video, the astronauts were seen to deploy small, shiny tools: cordless power saws. Gloves and bodies conveyed a trace of electric-motor whine into the spacesuits, to be picked up by helmet mikes. Plan C, if needed, involved small shaped charges. "Here's luck for a change," said Big Al. "These spars cut like butter."

Not entirely good luck . . . Kyle had hoped to use a spar stub as a grappling point for the orbiter's robot arm. The stumps sounded too soft for that purpose, which took them to Plan B-and-a-half. Gonzalez jetted slowly around the alien artifact, trailing double-insulated braided steel cable. The astronauts snugged the loop loosely about the masersat's waist-like indentation with a sturdy metal ratcheting clamp. Strong brackets with heavy-duty knobbed posts were secured under the cable, and the clamp ratcheted until the cable was taut. The spacewalkers jetted back to the waiting shuttle, each with an alien solar panel in hand.

"All set," said the mission commander finally. It meant the spacewalkers were back aboard and the wings stowed in the cargo bay. It meant Evelyn Tanaka, the only civilian aboard but NASA's unchallenged master at operating the shuttle's robotic arm, was ready to reach out

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and make history. It meant "Windy" McNeilly was set for another close encounter. The orange-insulated cable and chromed brackets made the waiting satellite far more visible than on initial approach. "Houston, six votes here for loading up this bad boy and doing a boogie on down."

All eyes were on Kyle. "Lots of ayes here, too, Commander."

Forty minutes later, with the long-sought satellite securely locked into a cargo-bay cradle, Kyle allowed himself to truly believe this was going to work.

Darlene clung to the railing, the gale streaming the remains of her breakfast away from the boat. Foul taste in her mouth aside, she felt better. That was not the same as feeling well.

Several embassy marines had accompanied the ambassador; one left the cabin to check on her. She couldn't recall his name. "Can I get you some water, ma'am?"

Sky, sea, and mud-covered land . . . everything was gray. Something caught her eye. Not far behind them, a pier stuck out to sea. The jetty, like the village that had once owned it, was mostly buried in mud, but the last twenty feet or so were uncovered. Huddling on the end of the pier was . . . something. "Do we have binoculars?"

"Yes, ma'am." He returned quickly with a pair. "Here."

The binoc view only amplified the apparent motion of the boat. Ignoring her nausea, she swept the glasses along the shore. There! A child of uncertain age was trapped on the end of the pier, clinging desperately to a piling around which her arms scarcely reached. Between crashing waves, the girl waved frantically. Her mouth gaped, but Darlene could hear nothing over the roar of the sea. She handed back the glasses. "Sergeant. Watch that jetty." She half-ran, half slid into the cabin, to see if the ambassador could, somehow, rescue the child.

The cursing that erupted behind her made plain, before the boat had scarcely begin to turn, that the storm had claimed one more victim.

CHAPTER 34

Only Kyle's feet were outside the shadow of the beach umbrella, and that exposure was by choice. He was planted in a beach chair, toes digging into damp sand whose moisture was sporadically replenished by swirls of mild Caribbean waters. An unopened novel rested on his lap.

Reading was the last thing he felt like doing.

Darlene's chair and his shared the umbrella. Beneath the wide-brimmed straw hat that covered her face she murmured in her sleep. She was the reason he was here. She badly needed a vacation, and the only way to get her on one was to go himself. Globe-trotting hadn't worn her out, it was her itinerary: disaster after catastrophe after cataclysm. He tried to share her worries, her sadness, but talking wasn't enough.

What was the world coming to when lolling on the beach with a beautiful woman was a duty instead of a delight? Sipping a piña colada, he tried to get interested in his book. What part of his frustration, he wondered, came from knowing he might as well be here as at the lab? Specialists needed the first crack at the recovered masersat. He'd only have been in their way.

Maybe he did belong on the beach: Project Clear Skies was *over*. (But not Project Swelk, his inner conniver rebutted. Kyle had yet to dare articulating the unsuspected step three.)

Aside from Dar's murmuring, all that could be heard were seagulls and lapping waves. They had a long stretch of St. Croix shoreline to themselves. Not many Americans could afford vacations these days, while former friends took their tourist Euros, yen, and rubles elsewhere.

The utterances muffled by Dar's hat

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

became whimpers. Her limbs twitched. Damn it! Kyle was neither mind reader nor gambler, but he'd have bet big bucks she was reliving that moment off Costa Rica. The one tragedy that, unfolding before her eyes, personified the many deaths for which she'd tried to extend America's often-rejected concern. That poor girl! How long had she been trapped at the dock's end, only to drown with rescue within sight?

And poor Dar, watching helplessly as it happened.

With a flash of *déjà vu*, the azure sky once more blossomed with remembered flames. Of the many deaths for which the Krulirim were responsible, none obsessed him like the five men and women on the *Atlantis*. He could no more have saved them than the doomed submariners or silo crews. The difference was he'd experienced the shuttle tragedy at first hand, and that it was of a scale he could viscerally understand. He understood Dar's grief, all right. The next time she cried out, he had an urge to join. He threw his book in frustration.

"Drink, mister?"

Kyle turned. The crockery on the boy's tray glistened with condensation. Cherry stems, cocktail umbrellas, and plastic straws peered over the rims. "A piña colada. Bill it to room 412."

"Two, please." Dar sat up and removed her hat. "I woke myself up." She shouted herself awake many nights.

"No, I disturbed you, hailing this young fellow." The lad kept from his face any reaction to the white lie as Kyle accepted two brimming drinks.

She waited for the boy to continue his rounds. "Not unless your voice rose an octave and you were whimpering."

"You've got to lighten up on yourself." He handed her a beverage. "No, really."

"Physicist, heal thyself."

Touché. He drew a long sip through his straw. "We are a sorry pair, aren't we?"

"Speaking of being sorry . . . I apologize in advance if this offends you." Holding her mock-coconut vessel at arm's length, she exchanged grimaces with its ceramic face. "We finally have the"—she glanced around furtively, although no one on the beach was in earshot—"item. It will be studied. Maybe it's time to apply that same focused attention to climate issues. Global warming. El Niño. Improved weather forecasting."

The same focused attention meant: Change what you're doing. Kyle, tackle a problem that's certain. She knew he knew. He leaned over and kissed her. "I really love you."

That didn't mean yes.

"UN SecGen demands custody of stolen Galactic guardiansat." Kyle ripped the clipping with its screaming headline from a corkboard. He hurled it, wadded and torn, into a trash can. What would the UN do with the artifact if they had it? He pictured it behind glass in a museum.

Before letting that happen, he'd swipe it *again*.

"Like a patient etherized upon a table." If Hammond Matthews had noticed his colleague's fit of pique, he gave no sign. It was Friday, and Matt wore scientist casual: jeans, T-shirt, white socks and sandals.

The outbuilding devoted to the study of the captured masersat was uncharacteristically empty. It's amazing, thought Kyle, what fifty bucks of pizza can accomplish. He would join the minithanks after his private viewing.

The "patient" spanned a line of lab benches. It was twenty-some feet long, and the canvas tarp draped over it revealed only gentle curves and the hint of a waist. "Try not to disturb it."

"We're doing our best."

The metaphor Kyle truly favored was too discouraging to express, a comparison that had first come to him as the charred, twisted wreck of the starship was trucked to Franklin Ridge.

The aliens had fusion power, an inter-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

stellar drive, and artificial gravity. How far ahead of human technology were they? Swelk said they'd had space travel for many Earth centuries. Still, a species as tradition-bound as the Krulirim surely discouraged the heresies that begat scientific revolutions. For sake of argument, imagine they were *merely* one century ahead of humans.

A hundred years ago, Earth's cutting-edge technology was vacuum tubes and biplanes. No jet engines or rockets. No quantum mechanics, which meant no transistors or integrated circuits. No computers or fiber optics. What would the best scientific minds of 1907 make of, say, a half-melted space shuttle or Boeing 777? What beside wings and a tail would make sense?

Negativism was a vice Kyle refused to indulge. He flipped back the tarp to uncover the familiar insectile shape. To his surprise, the satellite gave no evidence of having been opened. Except for strips of masking tape, it looked untouched. He felt the surprise on his own face. "But the wings came right off."

"Watch." Matt grabbed a portable electric heater with a pistol grip—an industrial-strength hair dryer. It started with a roar, heat shimmers rising from its nozzle. He directed hot air towards the stump from which had once sprouted a solar-wing spar. After a few seconds, a gap formed. The stump divided very near the hull, suggesting the hinge that had eluded the spacewalkers. Gripped in an insulated glove, the hinged joint swung freely. "No, wait." He waved off Kyle. After the area cooled, he straightened the spar and reheated it. The seam disappeared. Wiggling the stump showed the junction had returned to its former rigidity. "Works every time, at exactly the same distance from the hull."

Shape-retaining alloys were found in expensive eyeglass frames and golf clubs, but Kyle had never heard of a material that remembered and re-formed seams. "How'd you find this?"

"We wanted to get inside. There were no bolts to undo, no seams to unweld. Rather than cut at random, and damage who knows what, we did an ultrasound scan. It showed seams. The hull material feels," he rapped, "more like plastic than metal, so someone mentioned thermoplastic. We tried heating the lines from the ultrasound image."

Aha. "The tape on the hull marks heat-activated seams."

"This is why you're paid the big bucks." Ignoring Kyle's humph, Matt began heating the waist-like indentation between the main hull sections, rocking the satellite to reach completely around. "Everyone comments these sections don't look like they belong together." A space opened as he spoke. "Things are often as they seem."

Kyle pried gingerly at the newly opened gap with asbestos-coated gloves. The hull sections parted, only a few wires linking the halves. Every satellite he'd ever seen was jam-packed, its parts tightly interlinked. "Okay, one side has the phased-array antennas for active radar cancellation—stealthing. The other side has wave guides for the maser. Any guesses?"

"In a minute." Matt unrolled a paper scroll, weighting the corners with empty coffee mugs. The printout appeared to be an ultrasound image. "The other grafts are less obvious, but *four* pieces make up this baby. Look here," he tapped, "and here. You can see two smaller modules also spliced in. Like the radar section, there aren't many connections to the main body."

"Any idea what this means?"

"Yeah. Swelk told you the starship was a commercial freighter. She traveled with a film company. So why did the Krulirim have doomsday weapons?"

"We've all wondered." The question drove Ryan Bauer *nuts*.

"Here's our best guess," said Matt. "Imagine you're on the interstellar equivalent of a tramp steamer. You have no weaponry, but signaling equipment

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

must be *very* powerful to reach between stars. Say, comm masers." He rummaged in a cabinet drawer and found some candy. "At this rate, there won't be any pizza left. Now there's no reason to hide comm masers, but the aliens wanted these hidden. Their plan wouldn't work if we'd seen them frying the *Atlantis* or the early-warning birds. So what could they have carried that would hide comm satellites?"

"Radar buoys?" guessed Kyle. "Handy for returning to places one's already checked out. Only you reprogram the buoys to beam the opposite signal of whatever they sense."

"So we think." Matt popped a handful of candy into his mouth. "Say they've improvised a stealthed weapon. How is it aimed? The star sensors used with a comm maser wouldn't track a shuttle in flight." He tapped a small circle on the printout. "See this little guy spliced into the maser section? We hope to prove it's an IR sensor, interfaced to the onboard computer."

"What's this graft?" Kyle pointed on the scan to another hull alteration. This section had its own antenna; a few wires connected it to the main electronics section. His question elicited only a shrug. "Well, *I* have a thought. It looks like an independent, much lower power, microwave subsystem. Maybe it was used to read out the damned orbs. Swelk said the recording equipment was from the troupe's supplies."

"Makes sense."

His on-the-beach feelings of redundancy were largely confirmed. Matt's team was making tremendous progress. "Now the big question. Why did it stop working?"

By way of reply, Matt aimed a penlight. "What do you see?"

Kyle pondered. Fat wires leading from the two small grafts and the radar section ended in an ill-shapen metallic glob. Near that clump was something blocky whose only familiar features were a connection to the solar-panel stump and what looked like a "heat pipe" for transporting thermal energy to an external radiator. On a human satellite, the greatest source of heat was the main power supply. The blocky thing had a small scorch on an otherwise featureless and unused metal connector. He burst out laughing. "You just can't get good help these days."

"Yup," agreed Matt. "Bad power connections. It would seem a sloppy soldering job has given us our best chance yet to understand these guys."

I would've thought it impossible, thought Darlene, to be lonelier than the sole non-celebrant at a party. Now I know better. Being that lone non-celebrant's spouse was *much* worse. The intimate setting, an antique-filled sitting room in the White House Residence, only emphasized Kyle's withdrawal. She nursed a piña colada—she'd become enamored with them in the Virgin Islands—while chatting with the rest of the team. In a gathering of five, there was no disguising Kyle's silent sulking.

Britt said the president would be by to extend his appreciation, "for a job well done." For a job two-thirds done, Kyle had muttered, not that his principled dissent or his odd choice of fractions now mattered. Nor did it improve his mood that even she, however reluctantly and diplomatically, disagreed with him. As one of the team, she couldn't paper over *this* difference of opinion. Sighing, she again sampled her drink. The White House bartender was second to none.

The ringing of fine crystal got everyone's attention. Britt was wielding the silver spoon. "Everyone? A moment of your time, please."

"That ship sailed five years ago," said Erin Fitzhugh, drawing a laugh.

"Fair enough." Britt set down his champagne flute. "And since I, too, want to thank you all for your heroic efforts, that reminder is entirely apt. Darlene, Erin, Kyle, Ryan—the order of that

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

list being alphabetical, mind you—your country owes you a debt of deep gratitude."

Darlene at best half-listened to Britt's valedictory speech, brooding still on the fallout in her personal life of the group's unresolved rift. Despite every appearance of victory, Kyle wanted America to stay its course in a dogged quest for scientific certainties.

She didn't know how the mothership had been projected. She didn't *care*. The key thing was: it was gone. That, and that the masersats were neutralized—for which Kyle deserved full credit. They had in hand, finally, one of the orbiting weapons—again thanks to him. With his own lab showing just how kludged it was, continued anxiety about alien threats was no longer tenable. *Sorry, hon, we have more pressing problems.* Like mending fences with the ingrate rest of the world. Like ten-plus percent unemployment. Like climate disasters. Could I, she wondered yet again, interest him in global-change research? How rotten a wife would I be to try?

"The president will be here in a few minutes, to add a few words."

She set down her glass, shaking her head, no, when an attentive steward started her way. She'd be driving home. All she could do for Kyle tonight was let him drink freely.

The president entered. "Everyone, thank you for coming." Robeson circulated, shaking the men's hands and embracing the women. "What you accomplished, for country and planet, is exceptional. That so much had to be done in secrecy—and *was* done despite the approbation of the uninformed and unappreciative—makes those deeds all the more noteworthy. You have my complete respect and admiration.

"The dissatisfying part of our circumstances, I don't need to tell you, is the world's lack of understanding. That, my friends, makes the next point so difficult. It's surely far harder for you."

The president's gaze, which had been sweeping from face to face, locked now on Kyle. This will *really* hurt, thought Darlene.

"The campaign you orchestrated assured our victory. But in any war, especially one of subterfuge and deceit, an early casualty is truth. Suppression of the truth, our focus on the alien artifacts, and our custody of those artifacts, continue to estrange America from other nations.

"In a televised address Monday evening, I will announce completion of our program of alien study. The alien satellite and wrecked starship will be released to international investigation, under UN stewardship. I will also cancel the remaining satellite-recovery missions."

"Mr. President," Kyle blurted. "What about Clean Slate?"

"I'm sorry, Kyle. I know your concerns are sincere. That said, it's been a *long* time. Maybe the aliens tried something, and it did not work. You convinced us, rightly, that we had to understand the threat hanging over our head. Despite economic pain and world condemnation, we followed the course you laid. And maybe the alien captain was simply messing with our heads. The fact is, there is no credible evidence of an alien threat. So now. . . ."

"But Grelben didn't know Swelk had bugged his bridge." Kyle couldn't contain his frustration. Darlene cringed—you don't interrupt the president. You certainly don't use that lecturing tone with him. "Grelben couldn't have been speaking for our benefit."

"So *now*," repeated Robeson, "it's time to move on, to enjoy such modest rewards as are in my power to bestow. I have many friends in the private sector, for those looking to make a change. And you'll have a sympathetic ear for new challenges you may aspire to in the executive branch." Robeson winked. "I won't mind if you avoid positions requiring Senate confirmation."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Respectfully, sir." Kyle was nothing if not persistent, thought Darlene. Sometimes maddeningly so. "We haven't checked the Moon yet, although the aliens spent time there. We need a lunar program."

That remark earned Britt a presidential glower: he's *your* protégé. Britt read the dirty look the same way she did. He took Kyle's arm and steered him into a corner. Their whispered conversation was unintelligible but intense.

Darlene joined Kyle as soon as Britt left, standing so that to face her, Kyle remained facing the corner. Behind him, by the hors d'oeuvres table, Ryan and Erin compared notes animatedly—about Kyle's near meltdown, surely. Britt and the president were in another corner having their own one-on-one. "Honey, a boss once advised me, 'The third time I tell you something, I *really* mean it.' Wasn't there a third 'no' about a lunar program long ago?"

"I've lost count." He had the decency to look embarrassed, perhaps realizing he had pushed too far. "I'm getting another drink. You want a refill?"

"No, thanks. What about the president's gracious offer?" Diplomacy 101: when an issue is irresolvable, change the subject.

"Outplacement assistance?" He mimed deep thought for about two seconds. "Astronaut doesn't require confirmation." His answer was too loud to have been only her benefit.

Britt, thankfully out of Kyle's line of sight, extracted a twenty-dollar bill from a coat pocket and handed the money to the president.

Darlene would have given Britt long odds on that bet.

"Hi, Chuck," Kyle called to the bored-looking guard. Hammond Matthews, ambling at his side, waved a greeting. They tried to exude nonchalance: the visiting VIP and the Lab Director on a casual walk-by inspection.

"Greetings, Docs. Too bad you're working. It's a beautiful weekend." He pointed at the note taped to the glass door clicking shut behind them. "I haven't seen the computer geeks. Can I call the help desk for you?"

"No, thanks. It won't take long once they arrive." Matt's smile stayed internal until they rounded a corner. "No time at all." The advertised network upgrade was entirely fictitious.

"Your secret plan for assuring our privacy is a sign on the door?

Matt mashed his thumb onto the fingerprint scanner beside the lab door. "The note's a memory jogger for anyone coming by despite the well-publicized scheduled maintenance. Their ID card won't get them inside today."

The lab had been stripped in preparation for the masersat's arrival; weeks later, the room still looked barren. Odds and ends, however—soda cans and coffee cups, small tools, digital meters, misplaced cell phones, open tech journals left face-down, wire scraps—had proliferated everywhere. Five computers remained on despite the purported network upgrade, their monitors flashing screen savers. Amid chaos striving to reassert itself, the masersat awaited.

Beneath its tarp, the satellite gaped open. "You have the parts?" asked Kyle. Getting a nod, he unsoldered four electronic components. Whatever those devices did, components with like surface markings—parts codes, they hoped—were in every Krulchukor pocket computer.

Matt jotted a discrete number with a fine-point marker on each liberated item. It wouldn't do to get confused which parts came from where.

Eleven not-entirely-destroyed computers had been recovered from the *Consensus*. Not one functioned. All had, presumably, been damaged by the fire. Swelk's computer worked—but its memory was filled with alien movies. While Swelk's was their only operational alien computer, it was too precious to tinker with. This could be their last

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

chance to repair the other computers. Who knew *what* information those contained?

Of course, few of the computer components and none of the masersat parts *appeared* broken. Kyle imagined a 1907 engineer faced with an inoperative modern computer. If the only electronics I'd ever seen used vacuum tubes, what sense could I make of integrated circuits? Would ruined chips even look damaged? Heat can destroy electronics without melting the parts.

Which reduced them to crossing fingers and swapping components.

He tried not to consider the many permutations of parts substitutions ahead, as he soldered into the satellite scavenged same-labeled parts. Whatever the international monstrosity that eventually arose to examine the masersat . . . if and when they got their act together, and actual research resumed . . . he'd eventually suggest that *they* try chip substitutions. Perhaps by then he'd have an on-line tutorial explaining everything.

Life was never that cooperative, though, was it?

CHAPTER 35

"Hi, Stinky. Yo, Smelly." Boggy vegetation squished beneath their slowly shuffling, broad webbed feet. Good. Swelk had fretted about the unnatural metal decking her friends suffered aboard ship. The animals chewed contentedly on synthesized sludge, massive jaws sliding and grinding in a totally alien motion. Despite widespread suspicions that Krulchukor bioconverters employed nanotech, no one—certainly not Kyle—would endanger the Girillians by opening one for inspection. "Do they brush you guys enough?"

"Perhaps you could give the other guests a chance, sir." A zoo guard politely indicated the serpentine queue behind Kyle. Plenty of tourists were glued to the railing, but, Kyle guessed, none spoke so familiarly to the main attractions. "This exhibit is quite popular."

He moved along rather than argue. Seeing Smelly and Stinky was how he communed with his dead friend. He loved the cats, but associated them more with Dar. He drifted through the rest of Girillia House, murmuring as he went. None of these critters had bonded like the swampbeasts with Swelk; none affected him as deeply.

He found an empty bench. Swelk, he thought, at least *one* puzzle that had us stymied is solved. That reflection yielded a bit of the solace he'd sought unsuccessfully in Girillia House.

The computer Matt had repaired with masersat parts might—in twenty years? More?—lead to amazing breakthroughs. It wasn't a cookbook for fusion or interstellar travel, but it offered clues: operating procedures and detailed parts inventories. The recovered files, in Kyle's belief, held more promise than the charred starship surrendered to UN custody.

The *how* of the mothership holo-projection had gnawed at him long after the *fact* of the hologram became obvious. Why would the aliens have such equipment with them? Discovering the masersats to be cobbled-together devices had only deepened the mystery.

But now, extrapolating from newly recovered Krulchukor files, he had an answer.

The alien star drive, its physical principles still maddening obscure, was inoperative deep within a star's gravity well. Starships used solar sails to exit solar systems—sailing conserved He-3 for interstellar travel. In settled solar systems, big laser cannons rapidly propelled starships to where their drives could engage. In low-tech solar systems (which, in practice, meant any system not colonized by Krulirim), shipboard emergency gear included kits to build laser boosters. Seed a convenient, sunlight-drenched, silicon-rich asteroid with nanomachines. Wait a bit for semiconductor lasers, and the solar cells to power them, to grow. *Voilà!*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Moon's surface was one-fifth silicon by mass. Without an atmosphere, solar energy was abundant on the dayside.

If Swelk's translator had correctly converted units of measure, an emergency booster kit would expand into an about-kilometer-squared patch. An individual laser was a silicon structure only millimeters in size, but a full-grown booster contained billions. Inventory records showed several kits had been taken from ship's stores.

The evidence was entirely circumstantial, but Kyle was *sure* he finally understood the mothership trick. Just as Grelben's engineers had kludged masersats from onboard equipment, they, or perhaps Rualf's special-effects team, must have hacked into the booster-kit software. Change the aiming logic to track a Moon-orbiting radar buoy instead of a receding starship. Add an animation model of the movie-prop vessel to be projected. (Model, as well, the occasional holographic auxiliary ship going to or from the mothership—an effective bit of misdirection.) Schedule the hand-off of projection duties from laser patch to laser patch, to compensate for the Moon's rotation and to mimic the mothership's purported orbital path. For a species with centuries of computer experience, he guessed the reprogramming was a snap.

Memories of Swelk occupied his walk to the Metro station and the subway ride itself, reminiscences intermingled with hopes for a new beginning. In a West Wing waiting room, he tried to focus on the latter.

"Sorry, I'm running late. Crisis *du jour*." Britt had appeared in the doorway. "Much simpler than crises *we've* handled. Come in. Can I get you something?"

"Water, thanks."

"Carl, two Perriers." Once the earnest intern nodded acknowledgment, Britt led the way to his office. "How's my favorite diplomat?"

"Fine." He took a chilled bottle. "Busy." A workaholic, not that I'm entitled to criticize.

Britt draped his suit coat over a chair. "It's ominous when you get terse and tongue-tied on me. What now?"

"Good news, actually." Kyle took a photo from his shirt pocket. "Matt's team repaired a recovered Krulchukor computer. Unlike Swelk's, it *wasn't* filled with movies and a translation program." They'd have been out of luck, though, without Swelk's computer to translate for *it*.

Britt raised an eyebrow. "After all these years, they fixed it. Interesting."

Admit nothing. "Good things come to he who waits."

"We'll let that lie. What's on your always active mind?"

Had there been an emphasis on lie? "It was a crewman's computer. The maintenance files should be *very* helpful in recreating Krulchukor technology. Case in point." Kyle explained the mothership illusion. "It's nice to know why the mothership was off in lunar orbit."

An intercom buzzed. "Your next appointment is here, sir."

Britt picked up the photo. "For someone bearing good news, you don't seem happy."

Nothing would be gained by citing the maddeningly vague reference in a recovered file to Clean Slate. Nor would reasserting his unshaken conviction of dangers lurking on the Moon accomplish anything. Every suggestion over the years of a lunar program had been rebuffed. Krulirim were patient. They had to be—interstellar voyages lasted years.

Why was he the only one who believed Grelben's plans could be years in preparation?

None of this prevented Kyle from doing his damnedest to be prepared. "Dar predicts the president will give the computer, too, to the UN. Our favorite diplomat implies I'm bitter."

Britt clasped his hands, fingers inter-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

laced. "If, as I think likely, she's right, then what? Can I lure you into the District more often?"

"No, but with a good excuse." They had arrived, at last, at the reason for his visit. "I'd like to accept the president's offer of a job referral."

CHAPTER 36

Darlene's right leg dangled from the freestanding hammock, her bare foot inches above the patio brick. The hammock was nevertheless swaying, Kyle's longer leg rocking them gently. Her head rested on his shoulder. Blackie was curled up and purring on her lap. A mild breeze was blowing, moonlight was streaming. "Explain again why we hardly ever do this?"

He kissed the top of her head. "Because, Madam Under-Secretary, you're usually off gallivanting around the world."

That was a half truth not worth debating. She swigged some no-longer-cold beer rather than respond. The past few months, he was in Houston as much as she was gone on her own, more varied travel. The president, true to his word, had gotten Kyle a shot at a payload-specialist berth on an upcoming NASA shuttle mission. The payload for whose calibration, operation, and, if need be, repair, Kyle would become responsible did upper-atmosphere measurements, the details of which eluded her. Kyle's understanding, of course, was infinitely deeper than hers and growing daily. (They'd been together long enough that she knew nothing was larger than infinite, but she didn't care. She just wouldn't express the thought.)

The astronauts she'd met were pilots and engineers, not scientific experts. That surely mean the payload could be operated without a full theoretical understanding of the measurement techniques, or the climate models in which the measured values would be used, or the abstruse controversies that swirled around competing climate models . . . but there was no way *Kyle* would be satisfied flying without that expertise. So when he wasn't training at Johnson Space Center, he was immersed in self-study of atmospheric physics. They were once again coming at a globally vital problem from two entirely different sides.

This time, thank God, the problem wasn't eating him up. She patted his arm.

"Beautiful, isn't it?"

That could have been a reference to togetherness, the weather, the patio and its wooded setting, or the cloudless night sky aglitter with stars. Had her companion meant any of those things, he wouldn't have been *Kyle*. "The full Moon? Yes, it's gorgeous."

They were silently admiring its round perfection when, as if by the throwing of a switch, the Moon went dark.

"Yes, I'm serious!" insisted Kyle. "How's the weather? Look out your window."

"Sunny and warm. Basically like every day." His old college buddy, who lived in LA, sounded puzzled and not a little peeved. "Why did you really call?"

"The Sun's normal?" Kyle persisted into his cell phone. He'd outwaited a call-waiting signal. Dar ran inside to answer the house phone.

"Big bright yellow ball, intends to set in the west. *Yes*, it's normal. So this is about. . . ?"

"Gotta go—I'll explain later." He hung up over annoyed protests. Overhead, stars sparkled like diamonds, as brightly as ever. How, in a cloudless night sky, could the Moon be ghostly dim when in California, where it was just after six, the Sun was behaving?

There was no denying the apparition overhead.

He was swinging his telescope toward the spectral Moon when his cell phone rang. Dar yelled from inside, "That's Britt. I transferred the call."

"Hi, Boss." As best Kyle could tell, the Moon, apart from having gone ashen,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

was unchanged. He'd studied it enough nights to trust his impression. "Yes, I know. Yes, the Moon's gone dark and no, I can't say why." He unbent from his crouch over the telescope eyepiece. "But I'm on it."

Too many people jammed in a consequently overheated room. Too many speculations and too few facts. It was disquietingly like the arrival day of the Galactics.

Kyle fanned himself with a folder as he digested the latest findings. An obvious change from that earlier crisis was the medium of note taking: electronic whiteboards, read/writeable across the Internet, had replaced walls covered in Post-It notes. The Franklin Ridgers could as easily have coordinated from their offices, like the hundreds of scientists worldwide whose data they were collating. Crowding this room showed psychology trumping technology.

"That's one possible explanation shot to hell." Ellen Nakamura, a twenty-something new hire with spiky blue hair, hung up her cell phone. "Thank God." She threaded a path through the crowd to a terminal. On the big wall display marked "solar status" new text appeared: SOHO readings nominal. The Solar and Heliospheric Observatory probe was permanently stationed a million miles sunward from Earth, at an Earth/Sun gravitational balance point. If SOHO, with its plethora of instrumentation and uninterruptible view of the Sun, saw no variation in the Sun's behavior, that was definitive. The Sun was normal.

There weren't many ways to dim the Moon. Moonlight was only reflected sunlight, so a solar problem *could* have been the root cause. Nakamura was right: thank God. If the Sun were the source of the problem, they could all speedily freeze to death. A second wall was dedicated to an investigation of any unknown phenomenon impeding the light path from Sun to Moon, or Moon to Earth. Regularly updated windows mirrored the findings of observatories worldwide. Some big light blocker in space, never mind where such a thing could have come from, would likely also darken some stars. No such dimmed stars were in evidence. That did not eliminate a filtering disk *precisely* sized and placed to obscure only and exactly the Moon as viewed from anywhere on Earth. But how could such an object be held stationary, against the solar-wind pressure on such a huge expanse? "Matt. Any word on radar sweeps for a blocker?"

"He's stepped out," answered a voice Kyle didn't recognize. "But yes, there's news. Rear wall, lower left corner. Radar sees nothing between here and the Moon."

"Thanks." So if there were a light-blocking object in space, it's not only precisely positioned and placed, it's radar-transparent. Stealthed. If such an object existed, and popped up out of nowhere, surely it would be an alien artifact. Spoiling the moonlight . . . Clean Slate couldn't be anything simultaneously so huge and so petty, could it?

"Heads up."

Kyle turned toward the call and saw a can of Coke lofted his way. He bobbled the catch. "Thanks, Matt. I clearly need the caffeine."

"What'd I miss?"

"Can't be a solar problem and doesn't look like something in space blocking the light." That left the Moon suddenly absorbing light it had once reflected. That left the subject matter of a third wall, whose virtual caption read: lunar surface. The big observatories only confirmed what Kyle, with his amateur telescope, had decided minutes after the mysterious fadeout: the Moon's surface, other than darkening, looked unchanged. Optical telescopes and radar pinging alike detected no change to the Moon.

"Infrared." Matt whapped his forehead with the heel of his hand. "Matt,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

you dummy. Ellen! Do we have before and after IR images of the full Moon?"

"I'm on it." Ellen started typing feverishly.

"*Not* dumb, Matt. Sleep-deprived, probably. Brilliant, certainly." It was almost five in the morning. Almost time for his chopper ride to Washington, to try to make sense of this for the president and an emergency Cabinet meeting "If the Moon is suddenly absorbing more sunlight, it'll be hotter."

"Here's before," called Ellen. "It's an archival shot from the three-meter IR telescope facility up on Mauna Kea. A new display window opened on the wall devoted to lunar-surface findings, showing a grayscaled disc with occasional dark splotches. The gray-coded key confirmed the predominant lightly shaded areas were around 140 °C. The dark patches, in the shadows, were as cold as -170 °C.

"What about a current IR view?"

"The file is downloading now. Go figure—the Internet's slow tonight." Ellen rubbed her eyes wearily. "Got it."

Yet another window popped up on the wall, and Kyle's eyes popped open with it. The surface of the Moon was getting *colder*.

The details were far from clear, but at that instant Kyle knew what Clean Slate had to be. It was worse than anything he had ever imagined.

CHAPTER 37

Two years since The Big Dim, seven years after the arrival of the "Galactics," forty-some years since a boy fell in love with the space program . . . no matter how Kyle viewed it, today had been a long time coming.

No one but he thought of today's launch as Phase Three of Project Swelk.

He was flat on his back, strapped snugly into one of two mission-specialist seats on the *Endeavor*'s flight deck. He wore the uncomfortable collection of clothing and gear that in NASA-speak was a "crew altitude protection system." Besides the spectacularly misnamed antigravity suit, the "system" consisted of a helmet, communications cap, pressure garment, gloves, and boots.

In the two front seats, as on the masersat recovery mission, were Windy McNeilly as pilot and Tricky Carlisle as mission commander. Speedy Gonzalez had the mission-specialist seat beside Kyle's. The mid-deck compartment was empty. A crew of four was below the norm for a shuttle flight, but this was no normal flight.

"Are we boring you, Dr. Doom?"

Kyle struggled to abort a yawn. After three weather scrubs in as many days, they'd been woken abruptly last night as the weather forecast unexpectedly broke in their favor. His limited view out the forward windshields showed merely overcast, rather than the gusty rain that had kept them grounded. "Sorry, Craig. What can I do for you?" At this stage of the mission Kyle was simply a passenger. What *could* he do for Carlisle?

"Nothing, Doc. Ignition is not most people's preferred wake-up call."

"Don't worry. I promise I won't miss a thing." He followed the last-minute checklists and the cabin/ground-control chatter until, with a sound like the end of the world, the shuttle's main engines roared to life. Six seconds until takeoff. Then the solid rocket boosters added their thunder, and the shuttle started to rise. They began a roll, pitch, and yaw maneuver, tipping the nose for a head-down ride to orbit, in the process gaining a view through two overhead windows of the rapidly receding ground. Thrust squashed him into his seat. Amid the noise and vibration, 3 gs were far harder to take than in the training centrifuge in Houston.

"Throttle-down commencing," called Windy.

Air resistance, and the attendant stresses on the shuttle, were greatest early in the launch. Throttle-down reduced those stresses until the ship reached thinner atmosphere. The shak-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing and din seemed to have gone on *forever*, but the pilot's calm announcement meant they were only twenty-six seconds into the flight. The jarring kept intensifying, but at a lesser rate.

"Commencing throttle-up."

Which put them at about T+60 seconds. As the shuddering reached a peak, Kyle knew how a milkshake must feel. The Earth slivers visible from his backrow seat continued to recede.

"Approaching SRB separation." McNeilly had a hand beside the backup SRB separation switch, but the computers once again performed on cue.

The solid rocket boosters burnt out in two minutes. This was farther than the *Atlantis* got, some recess of Kyle's mind reminded him. He felt the thunk of the separation. The noise began to abate, both because the SRBs were gone and from the thinning of the atmosphere. From nowhere came a maddening itch on the tip of his nose. Ignoring the tickle seemed more sensible than lifting an unnaturally heavy arm.

"Negative return," radioed ground control.

More progress. They were far enough into the launch that an abort back to the Cape was no longer possible. Milestones continued passing normally as the ship climbed and the sky turned black and starry.

"Coming up on MECO," warned Windy.

Main engine cutoff, about eight minutes into the flight. More than seventy miles up. More than seventeen thousand miles an hour. And *no* separation from the external tank—two unmanned tankers awaited to top off their nearly empty ET.

"Three . . . two . . . one . . . MECO."

Kyle's arms floated free of the armrests. His stomach lurched. His pulse raced. It was suddenly, blissfully quiet; radioed exchanges with ground control were the only sounds. As he tipped his head backward, a bony finger poked him: Speedy reaching across the gap between their seats. "Welcome to space, Doc." In the front seats, Carlisle and McNeilly tended to the details of raising and circularizing their orbit. He could not tear his eyes from the panoramic view of Earth through the overhead cabin windows. He'd dreamed of this moment for forty-some years now, had an image in his mind's eye of sparkling blue and rich brown and lacy white.

The Earth stretched out below him was a cruel caricature of that expectation. Huge, angry whirlpools of cloud dominated the Atlantic. In the black masses of cloud masking much of western Europe, lightning sparked and flashed like Thor and Zeus gone to war.

And exactly as if hostile aliens had conspired to wipe Earth clean of all life.

The Big Dim was actually quite simple.

The Moon, like the Earth, receives solar energy at an average rate of 1345 watts per square meter. To darken the Moon, convert incoming sunlight to electricity. To cool the Moon, use that electricity to broadcast an electromagnetic signal . . . energy is removed instead of absorbed. Emit half of the incident energy that way, and—the Moon being far smaller than the Earth—the transmitted energy is about 3 percent of the solar energy Earth receives. By way of comparison, the annual change in sunlight that causes Earth's seasons is only plus-or-minus 3.4 percent.

And if the goal is at the same time to sterilize the Earth? Merely broadcast in a suitable microwave frequency. Pick a frequency to which the Earth's atmosphere is transparent, a frequency strongly absorbed by liquid water—then focus all of that energy on the Earth. A frequency of 2.45 GHz works well . . . the frequency used inside every microwave oven.

Solar energy to electricity? That's easy: solar cells. Electricity to microwave beams? That's also straightforward: masers. Solar cells and masers are readily fabricated from semiconductors,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

with well understood human technology. The most common semiconductor is silicon. By weight, a fifth of the lunar surface is silicon.

But what could cover the whole surface of the Moon with solar cells and masers?

Krulchukor laser cannons had already been grown on the Moon, enclaves of solar cells and semiconductor lasers reprogrammed to project the mirage of the mothership. That which has been reprogrammed can be reprogrammed again.

What humans call light and microwaves are only different regions in the electromagnetic spectrum, so resize and recalibrate new semiconductor structures to emit microwaves. Move the aiming point from a tiny, fast-moving radar buoy to the impossible-to-miss globe of Earth. Delete the code that limited the growth to small regions. Wait until the nanotech-produced texture—no dimension of its surface manifestation larger than inches, impossibly small to see from Earth—infests the entire lunar surface.

Then turn out the lights and crank up the heat.

"Like a freaking ballet outside, only interesting." Speedy was admiring an ET/unmanned-tanker rendezvous through a flight-deck window. "Doc. You gotta see this."

Kyle was out of her sight, on the mid-deck. "I caught the first act." The ET had already drained one remote-controlled tanker. The load from the second tanker would bring the ET to about half filled. That would more than get *Endeavor* where it needed to go. The hard part of space travel was reaching low Earth orbit.

"You staring dirtside again, Doc?" she persisted.

"Uh-huh." Doctor Doom was too many syllables for regular use. He'd lucked out—Doom would have gotten old. "It keeps me focused on why we're up here."

They were over the eastern Pacific, approaching the Panamanian coast. Two enormous tropical depressions were converging on the area. By historical standards, it was early in hurricane season, but the National Hurricane Center was already up to Norman on this year's second pass through the alphabet. Central America was going to get clobbered again. He couldn't help but remember that kid who washed out to sea. It had been one death among thousands in a single storm, and there had been hundreds of hurricanes, typhoons, and cyclones since—and it was *the* tragedy that still gave Darlene nightmares.

His eyes were glued to the ten-inch window in the side hatch. Logically, the view was no different from what he'd seen often in satellite imagery. Maybe so, but it was more real with only a pane of glass and vacuum between him and the unfolding catastrophe. As he watched, lightning erupted like popcorn over the cloud-cloaked mountainous spine of the isthmus. More mudslides in the making? *Damn* Grelben.

"Doc. Since you're downstairs, check on the MDS, willya?"

"Sure, Craig." The microwave dump system was one of the post-apocalypse retrofits to the orbiter. *Endeavor* had launched during a waning crescent moon; there was comparatively little Earth-bound microwave energy. Even if the Moon had been full, its microwaves were a different sort of hazard than the defeated masersats. Those had focused weapons-grade bursts on small targets. The endless lunar emissions blanketed all of Earth facing the Moon. The MDS reradiated the incoming, comparatively diffuse microwaves. "The panel shows all green."

"Thanks, Doc."

"Coming through." Speedy dove through an interdeck opening, with a grace in micro-g he could only envy. She retrieved a camera from her locker on the mid-deck. The storm caught her at-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tention on her return soar. With a tuck, roll, and light kick off a bulkhead, she stopped gracefully in mid-air. "Je-sus!"

"I wouldn't want to be wherever that monster comes ashore."

Another well-placed kick propelled her closer. She stared out the hatch's inset window. "You understand this stuff? Really?"

The implicit admission surprised him, since there was so much *be* had yet to learn. Maybe he'd feel more at home when the puking stopped. That half of astronauts had a few days of space adaptation sickness was little comfort. The old hands recommended keeping busy. " 'This stuff?' You mean how The Big Dim hoses the climate?"

"Right, Doc." She took a snack bar from a jumpsuit pocket. "You want half?"

His stomach gurgled. "No thanks. All right, the weather. The Moon used to reflect about 10 percent of sunlight hitting it, and that was scattered. Now, about *half* the incident light is re-emitted, and it all comes Earth's way. As microwaves. If the microwaves hit water—and Earth's surface is 70 percent water—they increase evaporation. Vast regions of moist, warm air rise, spun up by Coriolis forces." He pointed at the huge storms forming below. "Okay?"

"So far, so good."

"But more energy and more storms are just the start. Greenhouse effect is the kicker."

She nabbed a crumb that had floated off. "I don't get it."

Not her field, not her fault. "During the day, solar energy soaks into the ground. The heat re-radiates to space at night, as infrared. But some gases block IR, trapping heat in the atmosphere. The effect is like glass in a greenhouse."

"Like carbon dioxide."

At five miles per second, crossing Central America didn't take long; the *Endeavor* made the traverse while Kyle was in what Dar called pedantic mode. A hurricane was brewing in the Caribbean. "Right. But not only carbon dioxide. Water vapor is another greenhouse gas."

"Aha. The microwaves increase evaporation, producing water vapor, which traps heat, which further increases evaporation. A vicious cycle." She finished the snack bar and carefully zipped the wrapper into a pocket. "The evaporation leads to more clouds, and so to more rain."

"Yes, but not indefinitely. Hot air rises. The water vapor-laden air rises. Rain, of course, begins as airborne droplets forming in the cool upper atmosphere, condensing around airborne dust. Condense enough water, and the drop gets heavy and falls. But these microwaves evaporate water from would-be raindrops. So the new vapor rises still higher, into colder and colder parts of the atmosphere. Drive the vapor high enough, and you get permanent upper-atmospheric ice crystals instead of rain."

"I'm a simple mechanic, but haven't we had *more* rain since The Big Dim, not less?"

Simple mechanic? Speedy had a Ph.D. in aeronautical engineering. He made the mistake of looking at her. She was suspended in mid-air, her body at almost a right angle to what his confused senses considered the vertical. The little food he'd kept down that day made a fresh attempt to escape. *Keep busy.* "True observation, but not a rebuttal. It means that for now the increased oceanic evaporation is a bigger effect than vapor trapping in the upper atmosphere. Both effects are bad. Both are incontrovertibly ongoing."

Grabbing his arm, she pulled herself toward the deck. The enormity of the situation had just registered—there was horror in her eyes. "So left to itself, this process cranks along until greenhouse effect makes Earth too hot for us, or until all water is locked up in the atmosphere."

He favored her with the optimistic smile he'd been practicing on Dar.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"That, my friend, is the reason for our jaunt to the Moon. We're going to find a way to stop the process."

CHAPTER 38

The ungainly vessel sparkled in *Endeavor*'s floodlights. The fifty-foot long spacecraft cautiously receded from the orbiter, puffs of gas gradually increasing the separation. Bulbous tanks, exposed struts, and an aggressively unstreamlined configuration made plain that the newly disgorged ship was never meant to touch an atmosphere.

The nearby Moon, around which both vessels now orbited, cast only a pale, ghostly glow—as far as the human eye was concerned. The torrents of microwaves continued unabated.

"Everyone comfy?" Windy's light tone fooled no one—she wanted, as much as anyone, to walk on the Moon. But someone had to stay on the orbiter—it landed on Earth as a glider, hardly a practical approach for alighting on an airless body—and the person best able to bring the *Endeavor* home, if for whatever reason the lander failed to return, was the logical choice.

"Roger that, Windy," The mission commander answered for the three strapped in on the lander. "Ready to go . . . except for one final detail. Doc?"

It was a moment of high historical drama and great personal honor. The president herself—Harold Robeson's second term had expired before the lander was completed—had asked Kyle to christen the lander. She must have ordered NASA and his USAF crewmates to keep to themselves any opinions on the subject. What could possibly compare with "The *Eagle* has landed"? Beyond memorability, he wanted a name that conveyed hope and confidence and, despite the ship's wholly American provenance and crew, an entire world's aspirations.

The timer decrementing before him insisted that, named or not, this vessel would begin its de-orbiting burn inside five minutes. "Ladies and gentlemen, I give you the good ship *Resolute*."

The moon-spanning circuitry very precisely, in some way yet unknown, tracked the Earth and focused a myriad maser beams upon it. No one wanted to learn the hard way whether proximity detection could instigate a close-in defensive retargeting. So, although the tangential approach of the *Endeavor* had evoked no discernible response, *Resolute* de-orbited above the night side, where the solar-powered masers were inactive. But they couldn't accomplish their mission by hiding in the dark. Speedy set them down inside a small crater, entirely unremarkable but for its position about an Earth day to the predawn side of the onrushing day/night terminator.

"Houston," reported Tricky Carlisle, "the *Resolute* has landed." He covered the mike with his hand. "Resolutely, I may add."

Applause from Mission Control, after the unavoidable but annoying two-and-a-half second round-trip delay, almost drowned out CAPCOM's equally business-like, "Copy, and congrats." There was a short silence, into which Windy McNeilly from lunar orbit injected her own well-done, before Houston continued. "*Resolute*, you're cleared for a stroll."

The few minutes it took to seal the space suits worn for the landing were interminable. Kyle was second through the single-person airlock. He found Carlisle standing on a large mat; more pads, with adhesive backs and Velcro tops, remained in the airlock. Peeling paper sheets from the adhesive, Kyle handed down several pads before climbing gingerly down the landing leg that doubled as a ladder. The crescent Earth floating above the crater wall nearly took his breath away. Carlisle gave him a friendly nudge, reminding him to clear the area. The crater floor glittered and shimmered in the earthlight. Faint

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

crunching sounds accompanied his footsteps, transmitted through mat and boots into his suit—brittle circuits crushed by his weight. Moments later, Speedy reached the foot of the ladder.

Carlisle's voice came over a private radio channel. "One more presidential curse, Doc. Say something catchy."

Kyle, having suspected this was coming, was prepared. He switched to the mission's unencrypted main frequency. "On behalf of all humanity, we reclaim our moon." Faint green digits floating on his heads-up display counted down to local sunrise. He returned to a secured band. "Now what do you say we reclaim our first acre?"

They had an aluminized plastic tarp spread across the crater with hours to spare.

Kyle stood on the lip of the crater they now called home. From a thin crescent when *Resolute* had landed, the Earth had waxed near to half full. An enormous cyclone threatened Japan, and a second, the Philippines. Would those storms have formed absent the alien attack? There was no way to know.

He shivered, and it had nothing to do with the menace they battled. His suit thermostat was cranked low to minimize the drain on the batteries. In the tarp's shadow it was cold enough to liquefy nitrogen. "Speedy, I'm ready to walk the back forty."

"You're on camera," she assured him.

Kyle stepped out from under the awning, the direct sunlight all the more blinding for the contrast with the light-stealing surface. A metallic mesh was embedded in the glass of his helmet's visor, like the window in a microwave-oven door. Exactly like a microwave oven . . . the openings through which he gazed were too small to admit microwaves. Downhill, like a rock garden arranged by drunks, stretched their experimental plots: dozens of regions of varying sizes, shapes, and textures. Pole-mounted videocams swept back and forth, monitoring each plot. It was ironic, Kyle thought, that they'd had to bring solar cells from Earth to power the cameras.

He made his way carefully down an inter-sector boundary, along what Carlisle had dubbed a carpet runner. Nails driven by rivet gun into the rocky surface held the walkway in place; an adhesived patch had been set carefully over each nail head to seal the hole. The Velcroed surface gripped Kyle's boots, holding him to the supposed nanomachine-free safety of the from-Earth path. It wasn't as though on a microscopic scale the adhesive didn't have gaps—they had no choice but to trust the shadows from the patches to keep the nannies underneath inert.

As on every sticky-footed excursion from the *Resolute*, Kyle felt cheated. He longed to move about in the kangaroo hop made famous on the Apollo missions. Status lights in his helmet reported all three microwave re-radiators in his suit were operational.

"Are you done yet?" Carlisle's words, accompanied by a chuckle, were more an old joke than a status inquiry.

"Just medium rare." Humor was the only way to cope with the ever-present danger. Untreated, each square meter of the sunlit surface generated close to 700 watts—like the interior of a standard microwave oven at its full-power setting. He was in line of sight of *many* square meters. Line of sight . . . or line of fire. It was a disconcerting thought. The gauge on Kyle's wrist detected none of the microwaves that, had they been directed at him, should be immediately dispersed by any of the three re-radiating systems he carried. Despite the redundancy, he yearned for a physical, foolproof, grounding cable. Alas, a trailing tether would almost certainly slide off the protective runways and onto the nanny-covered lunar surface.

Their crater was a dimple within a great flat plain, one of the lunar maria. Standing on that "sea-level" surface, he

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

could see barely a mile in any direction, the horizon foreshortened by the Moon's diminutive size. Small relative only to Earth, of course: the surface area was close to fifteen million square miles. As many stars shone overhead, diamond-brilliant and unwavering.

"Quit your sightseeing," called Carlisle.

"You caught me. Again. Starting with plot one." Bending and crouching, pacing back and forth along a runner, he examined the first plot from several angles.

Soon after landing, in the shadow of plastic sheeting temporarily stretched between poles, this slice of territory had been bulldozed clean of visible infestation by radio-controlled robots. The little RC vehicles would stay behind and be teleoperated from Earth; Las Vegas bookmakers were taking bets on how long the devices would last. Alien circuits began refilling the area as soon as the Sun-blocking sheeting came down. The masers and the solar cells powering them were completely restored within minutes.

They'd "fenced" the area with shadows before the robots scraped it clean again. The field regenerated almost as quickly the second time, this time entirely from random spots within the torn-up field. It was, apparently, hard to remove every trace of nanotech "seeds" too small to see. That result reinforced the mission directive against touching the surface. They'd mechanically cleansed plot one repeatedly, and the results never changed: rapid regrowth. Repeating the experiment at scattered test spots gave comparable results. The propagation rate was always in the neighborhood of seven miles per day. "No surprises, Craig. Plot one is entirely regrown since your last inspection. No holes or gaps. I'm moving on."

The next few plots had, like plot one, been wiped clean and allowed to regrow to calibrate growth rates. There was some variation, correlated to robot-measured differences in trace-element concentrations. Plots two through ten had been treated with acids, bases, and other pollutants. No chemical made a significant difference to the regeneration rate. No coating disabled unplowed masers or solar cells for any useful length of time. For completeness—Kyle privately considered it more a matter of desperation—they were trying combinations. "We're not accomplishing a damn thing here."

"Any thoughts why?" asked Speedy.

"Sure. Nanomachines manipulate individual atoms. With such abundant solar energy, the nannies have no problem repairing themselves or cloning themselves or disassembling any inconvenient molecules created by our chemical spills. We must concurrently destroy *every* smaller-than-microscopic nanomachine, and keep new ones from migrating in from neighboring areas, to make any difference. The little critters are too hardy."

"That sounds a lot like admiration, Doc," said Carlisle. "By the way, no progress here, either." The commander was inspecting another stretch of plots, these heat-treated. They'd tried, among other methods, a rocket-fuel flame thrower, an electric-arc furnace, and a large, sunlight-concentrating, paraboloid mirror. It took three thousand degrees to purge a shadow-fenced area. No one could imagine a way to apply the technique on a Moon-wide scale.

"It is admiration, but don't worry." Kyle straightened from the crouch in which he'd been eyeing yet another plot. "Respect for their ruggedness doesn't detract from the scariness." If only there were some way to tame these beasts.

It didn't help Kyle's mood that by the time he headed back to the ship a new typhoon was forming in the Indian Ocean.

Kyle resisted the inane urge to wave at the fast-moving glimmer that was *Endeavor*. "How's the R&R, Windy?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The pilot mocked retching. "It's no holiday when all the food is reconstituted."

The meals down here were squeezed from tubes. There hadn't been weight margin or physical space in the lander for a fancy, shuttle-style galley. Of course, Windy would trade places with him in an instant. "How's our farm looking from up there?"

"Huh. I thought the idea was to *not* grow stuff."

"Ahem?"

"Lessee." There was the unmistakable flipping of paper in a clipboard. "Okay, these are my notes. I'll downlink the details in a minute. For fields one through eighteen and twenty through thirty-six, the emissions as always correlate nicely with the size of the plot and the regrowth rate you're reporting from the ground."

"And nineteen?" Kyle didn't let himself get excited. Most anomalies were data-collection glitches.

"This is interesting. Right after our noble commander last flame-broiled nineteen, not only did nineteen turn off, but I noticed that a whole region around that plot stopped emitting."

That *was* interesting. "And did that larger area come back on when plot nineteen did?"

"Roger, Doc." There was more rustling of paper. "And guess what: plot nineteen is smack in the middle of the larger blanked-out region. What do you suppose it means?"

"I am without clue." With a fat gloved finger, Kyle poked at the keypad on his suit's left sleeve. His head's up display showed that three of their little robotic tractors were idle. "Windy, how much longer are you in range?"

"Directly? Three minutes plus. But one or more of the satellites we deployed always has *Resolute* in line of sight."

He should have remembered that. The eighteen-hour days were taking a toll. Best to confirm his thinking. "Beside comm, they detect microwaves, too? Show if an area is on or off?"

"They have to be pretty much right above to spot beamed microwaves, but then, yes."

The planet overhead had passed full and was waning. In a few Earth days, lunar night would fall and they would pack up and rendezvous with *Endeavor* for the trip home. There could be no more unique clock, nor a better reminder of why they were here.

How much longer did they have to save the Earth? Climatologists, when pressed, threw up their hands. Before The Big Dim, they had invested years, even decades, on competing models of global warming—simulations envisioning nothing *remotely* like recent conditions. The not-for-attribution best guesses were that temperatures would creep up and up until upper-atmosphere vapor levels crossed a much debated threshold . . . followed by runaway greenhouse effect. After that, planetary temperature would skyrocket.

Can you say Venus?

His exhausted mind had wandered again. "Trickster? Speedy? Were you listening?" Both responded in the affirmative. "I'd like the untasked robots to go over plot nineteen with a fine-toothed comb."

"Agreed," said the commander. "Windy, you and your flock of birds keep an eye on us."

Neither the patiently surveying robots nor their human controllers had noticed anything different about plot nineteen when, once more, it and the surrounding region went inert.

"Good morning, *Resolute*," called the familiar voice. "This is Carlene Milford."

"Good morning, Madam President," answered the three crew. It was morning in Washington, but here lunar nightfall was fast approaching. They were nearly packed and entirely eager to go home, even though they had left not a single bootprint on the Moon's surface.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The *Resolute*'s landing stage, like the mats and runners on which they had trod, would stay behind with its certain contamination of dangerous nanotech.

"My compliments, and the world's appreciation, for your bravery and discoveries. We wish you a safe journey home."

At least, thought Kyle, the rest of the world has finally accepted reality: that the aliens had been a threat. "Madam President, are you linked into our video system?"

"Yes, Dr. Gustafson. Those are cramped quarters you've been living in."

While true, the Apollo astronauts had managed in a fraction the space. "If you can, ma'am, I suggest you switch to our camera six." Presidential calls are scheduled well ahead of time, giving Kyle ample opportunity to preposition the videocam. One of the lander's monitors showed the recommended fisheye-lens view of the pallid surface, across which, if one looked closely, several black rectangular mats were distributed.

"You've worked with presidents, Doctor. You know how busy are our schedules. I've been briefed, of course, but I'd like to hear from you directly a short summary your findings."

The operative word, Kyle knew, being *short*. What on her docket was more urgent than preventing life's extinction on Earth? "Yes, ma'am. You're aware the aliens covered the Moon with self-growing, self-regenerating masers, and solar cells to power the masers. These structures are tiny, on the scale of inches. We also knew there had to be, but did not at first find, components for control. There had to be sensors for locating the Earth in the lunar sky."

Viewed from the Moon's surface, Earth spanned a mere two degrees of arc. Due to the tilt of the Moon's axis and the ellipticity of the Moon's orbit, Earth from the same lunar vantage point migrated around a celestial box of about fifteen degrees by thirteen—movement the astronomers called libration. These weren't details any politician wanted or needed. "As there has to be computing power somewhere giving very precise directions to the masers." Any single maser was a physically rigid structure, the direction of whose output was fixed. By precisely controlling the emissions of *sets* of masers, however, those outputs could be aggregated into vast steerable beams. It worked just like a military phased-array radar.

"Not my specialty, Doctor, but it seems logical."

Kyle fancied he heard the sound of eyes glazing. *Simplify!* "Our work involved altering test plots on the lunar surface. As expected, a cleared region did not radiate until the masers regrew. To our surprise, however, one experiment rendered inert an area much larger than had been temporarily cleansed. We had happened upon a sensor that gave steering guidance. When that sensor could no longer spot Earth, the masers that it controlled stopped firing." Emissions from a blinded region would likely interfere with an adjacent well-aimed beam; suppressing an area whose sensor was for any reason target-less made sense.

"It sounds like we finally got lucky," said the president.

Now that the explorers could recognize the sensors, they knew how widely those sensors were dispersed. They had actually been *un*lucky, considering how much landscape had been tested, to go as long as they had before randomly encountering a sensor. "We've been using our utility robots to blind sensors with opaque scraps." While nanotech quickly regrew a *destroyed* sensor, an intact sensor could be covered. The nannies didn't distinguish shadow from nightfall.

"And the robots can spot sensors?"

If only it were that easy. "You might have heard of archeologists hunting for lost cities with space-based, ground-penetrating radar. Major McNeilly"—he caught himself before calling her Windy—"used *Endeavor*'s radar to map

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

beneath her orbit. A subsurface view, and only using a narrow range of frequencies, reveals a non-obvious large-scale structure. The alien infestation repeats on the scale of a square kilometer. There's a sensor at the center of each region.

"This is what we do. Using the radar survey, we guide a robot to the center of a region. As the robot trolls back and forth, we use its videocam to hunt for a small and subtle discontinuity in the artificial surface: the sensor. The robot then parks atop a suspected sensor until a satellite passing overhead can confirm that the surrounding area has stopped emitting. The robot sets a scrap of asbestos over the confirmed sensor, then heads off to the next region." At a snail's pace.

"It sounds ingenious, Doctor. Is it too soon to say our problem is solved?"

He suppressed an oath. The Moon was *big*. "I'm afraid, ma'am, that it *is* too soon. Disabling all the masers this way will take an armada of moon-orbiting satellites and myriads of moon-crawling robots. There are millions of sensors to be blinded, one by one." And, perhaps, again and again. Kyle expected the nanotech to eventually, atom by atom, carry away the obscuring mats—as they had, on the day of The Big Dim, removed the last thin skin of lunar dust that had disguised the spreading infestation.

"It sounds like an epic undertaking, Dr. Gustafson, but nonetheless something we *can* undertake. We have far greater cause for hope than before this expedition. I look forward to discussing it with you, and to meeting with the whole crew, very soon."

The president did not articulate the thought in everyone's mind. The four astronauts were returning to a remote quarantine, their exit from which was far from certain.

CHAPTER 39

"Ready for another first, guys?"

McNeilly sounded altogether too chirpy, but it was probably just pilot bravado. The alternative explanation, pilot exhaustion, didn't bear thinking about—nor could Kyle do anything about it. "I say we get out and walk."

The first to which Windy referred was a manned aerobrake maneuver. The heat tiles that insulated *Endeavor* during its fiery reentry had been designed for near-Earth missions. Symmetry was a cruel mistress: just as the orbiter had had to add speed to reach the Moon, it now had more speed to shed than any previous returning shuttle. That faster-than-spec reentry turned directly into unacceptable thermal stress on the tiles. Instead of reengineering yet another critical system, the mission had turned to a technique previously tried only with robotic interplanetary probes.

"Hold onto your helmets, folks." The orbiter shuddered as it bludgeoned its way through the Earth's upper atmosphere. The angle of attack was by intent shallower than any previous reentry. "Getting toasty up here." The "up here" was because Windy, for her own protection, was alone on the flight deck. Those who had been to the lunar surface remained sealed in *Resolute*'s claustrophobic ascent stage, inside *Endeavor*'s cargo bay. Darkroom-style red bulbs provided their only, and decidedly dim, lighting.

"Nearing 1400° C." Carlisle meant the tiles, not the flight deck. He was studying telemetry from the cockpit. His remoted instruments reproduced everything he would have seen in his now-empty command seat beside the pilot. "I'd say that qualifies as warm."

"And back out we go."

Kyle clutched the arms of his acceleration seat as the cabin vibrated like mad. Aerobraking was such an antiseptic term. In reality, the *Endeavor* had hit the atmosphere at almost seven miles a second. The Earth's skin of air was softer than, say, a brick wall . . . but at these speeds, not by much. The trick was to strike a glancing blow. Each dip into the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

atmosphere removed a bit of velocity, followed by a return to space to shed the friction-induced heat. If they entered at the wrong angle, the *Endeavor* would bounce like a stone skipping off a lake, or heat up past the thermal tiles' capacity to protect them.

"Whee!" Gonzalez was either having a great time or had forgotten their thin margin of safety. Maybe both. "Once more, Windy."

"Anything for you, Speedy."

A few tooth-rattling repetitions slowed them enough for a sedate, five mile-per-second low Earth orbit, circularized at an altitude of two hundred miles. Landing from LEO should be a piece of cake—if all the aerobraking shocks hadn't dislodged too many tiles.

"Great job, *Endeavor*."

"Copy that, Houston. Quite a ride, actually."

"Sorry to be the bearer of bad tidings, but you'll have to wait a bit longer. Storm in the Marshalls." That put off until the weather cleared another item for the record books: the first shuttle landing at a remote Pacific atoll.

Quarantine Central.

Endeavor smacked the isolated runway, bounced, and settled into a fast roll. The landing strip had been lengthened for them, but the curve of the atoll limited what could be done. They shook with relief when the orbiter coasted to rest with only a few hundred feet to spare.

"You make it look easy, Windy. Whenever you're ready."

"Thanks, Houston." Over the in-ship radio Kyle heard flung metal buckles striking whatever—and a meaty thud. "Head rush."

It was a wonder, thought Kyle, the shuttle pilot could stand at all. Except for a few minutes acceleration and deceleration, she had been weightless for almost a month. By rights, someone should have helped her from her seat. That was a risk no sane person would take.

"Tricky, Speedy . . . Doc." The pilot was breathless merely from struggling back to her feet. "It's been . . . fun. See you . . . in a few weeks."

They watched by closed-circuit TV as their shipmate stumbled to the middeck. Braced against a bulkhead, Windy waved at the videocam. "Stay out of trouble, guys." She struggled briefly with the hatch's release. As the door slid aside, TV showed the three (still sealed in the *Resolute*'s ascent stage) an approaching, teleoperated motorized staircase. Windy would be taken, entirely by remote-controlled vehicle, to the farthest part of the atoll. They, once she was safely away, would go to their own, separate quarantine.

They had one final task to perform first.

Kyle and Craig Carlisle struggled with the suddenly heavy cooler-sized chest, in which nested smaller vacuum-sealed vessels. Each inner container held lunar-dust samples, harvested by abandoned robots. Gonzalez, meanwhile, opened the hatch into the *Endeavor*'s payload bay. Two weeks in one-sixth g, Kyle decided, were little better than free-fall the entire time as McNeilly had experienced. All three were panting before they'd wrestled the chest from the ascent vehicle, through the orbiter, and down mobile stairs to the concrete runway. It was the middle of the night, as per plan, and the electric lighting on the stairs was decidedly dim.

Out of breath, Kyle awaited another remote-controlled vehicle. Out to sea, warships were discernible only by their running lights. They were here to enforce the quarantine.

A driverless truck rolled up. "Excuse the informal welcome," announced an unseen speaker. Grunting, the astronauts hoisted the chest onto the flatbed and slammed shut the tailgate. The truck looped around them and drove to a pier jutting into the lagoon. Darkness and distance kept Kyle from seeing ex-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

actly how the chest was transferred to the awaiting submarine. No one knew how best to isolate the nanotech samples, or how rapidly the contagion might reproduce in terrestrial conditions. For lack of an alternative, the safety protocols in the onboard labs, converted torpedo rooms, were based on biohazard containment.

The submarine sailed off into the midnight darkness, headed, Kyle knew, for the deepest point in the island's lagoon. Nuclear powered, the sub extracted oxygen by electrolysis and desalinated its drinking water. The Navy boasted that its subs could remain submerged as long as the food lasted.

In the worst-case scenario, *this* sub would never surface.

The driverless truck returned. "Hop in, folks," crackled the speaker. "Time for your all-expenses-paid tropical vacation, courtesy of Uncle Sam." They climbed in for the ride to a nearby cluster of huts. It went unspoken that their stay could be permanent if the coming dawn revealed an outbreak of alien nanotech.

No one slept until an entirely ordinary sunrise became a gloriously ordinary day.

EPILOGUE

Kyle and Darlene strolled hand in hand along a serpentine strip of sand. Combers rolled lazily into the lagoon of the lonely atoll. Wind sighed through the fronds of palm trees. Stars sparkled overhead, all the brighter for the pallor of the altered Moon. Both were barefoot, wearing only thin shirts over swim suits. Humidity had frizzed her hair.

"You shouldn't be here, you know." The gentle squeeze he gave her hand belied his words. "It's dangerous."

She snorted. "Yeah, I can see what hardship duty this is."

"It didn't tell you something that the only way you could come was to be lowered in a harness from a helicopter?" And that the chopper pilot then jettisoned the cable, a very *long* cable, instead of rewinding it?

"I missed you, too."

They'd talked for hours. Cat anecdotes. Weather disasters possibly caused by the microwave onslaught. The paperwork minutiae of modern life. Cat anecdotes. Radioed progress reports from the submerged lab. There was, at last, some unmitigatedly upbeat news: discovery that the nanotech was optimized for unfiltered-by-atmosphere sunlight. The nannies, should any escape, would spread *much* slower on Earth than on the Moon.

With miles of tropical beach to themselves and, for the moment, perfect weather, apocalyptic scenarios and civilization's routines seemed equally improbable. Kyle whistled softly to himself, at peace with the world.

Darlene stopped short. "I know that look."

"What look?"

"That cat-that-ate-the-cardinal expression." Stripes was quite the huntress; and there were no wild canaries in Virginia. "Like someone who thought his hidden agenda for refueling shuttles in space was, well, hidden."

"You *knew?*"

"Honey, we all suspected." She pecked his cheek. "Retrieving the masersat was the right thing to do. It didn't matter that the capability to do so might also make other things possible."

"And you never said anything." He said it wonderingly—one who conspired had no standing to complain about others holding their tongues.

"So . . . about that *look* of yours."

"We, mankind, have no choice but to develop a major lunar presence. People manufacturing robots and dispersing them across the Moon's surface." He rotated slowly, drinking in the beautiful night sky. This near the equator, many of the constellations were unfamiliar. It still took him a moment to get his celestial bearings. "Maintaining that human presence will mean mining the ice in the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

eternal shadows, the forever nanotech-safe shadows, of the Moon's polar craters. If permanent defeat of the alien nanotech does not come quickly—and nothing about this battle has gone smoothly—supporting lunar outposts will mean more space travel, to harvest icy asteroids. But that's okay, because just as reaching low Earth orbit is most of the work of getting to the Moon, a lunar base is the hard part of reaching the planets."

His thoughts churned faster than he could find words. His mind's eye pictured mechanisms for *aiming* banks of masers, rather than simply blinding their sensors. Steer the microwaves to antenna farms in the deep desert, where water vapor won't be increased, and the Moon became Earth's solar-energy power plant. And if research could recover the original programming of the Krulchukor laser cannons? It would mean human sail-equipped spacecraft.

"Swelk never meant Earth any harm, so the outcome is fitting. The result of her visit will be, not disaster, but a rebirth of human exploration. I sincerely believe that her legacy will be mankind's dominion over the solar system."

"Keep going."

"Huh?" Gentle amusement wasn't the reaction he'd expected to his impassioned speech.

"Don't even try to bluff a diplomat. It's never going to work." She peered at the ghostly crescent overhead. "Since long before we met, the Moon has been your obsession . . . yet you've scarcely glanced at it since I arrived. So I want to know, what has taken its place in your always scheming mind?"

He indicated a brilliant red spark near the horizon. A telescope for the object's proper study topped his wish list for the next airdrop. "I don't expect it to be me personally"—not that I expected to go to the Moon, either—"but *that* is what. *That* is mankind's next big step.

"Mars." ■

The author's web site is:
http://www.sfwa.org/members/lerner

MOVING?

Please send both your old and new address (and include both zip codes) to our subscription department:

ANALOG
6 Prowitt Street
Norwalk ,CT 06855

or fill out the change-of-address form on our website:

www.analogsf.com

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

THE REFERENCE LIBRARY Tom Easton

Saturn, Ben Bova, TOR, $24.95, 413 pp. (ISBN: 0-312-87218-6).
Extremes, Kristine Kathryn Rusch, ROC, $6.50, 374 pp. (ISBN: 0-451-45934-2).
Callahan's Con, Spider Robinson, TOR, $23.95, 288 pp. (ISBN: 0-765-30270-5).
Blind Lake, Robert Charles Wilson, TOR, $24.95, 399 pp. (ISBN: 0-765-30262-4).
Dark Ararat, Brian Stableford, TOR, $16.95, 352 pp. (ISBN: 0-765-30596-8).
The Green Ray, Jules Verne, Wildside, $35, 124 pp. (ISBN: 1-59224-035-6).
The Big Splat: or How Our Moon Came to Be, Dana Mackenzie, Wiley, $24.95, 232 pp. (ISBN: 0-471-15057-6).

I find it interesting when the fiction I am reviewing seems to echo what is going on in the real world. There is no *real* connection, of course, but the apparent connection adds interest. From the point of view of the writer and publisher, it may even help sales.

So what is going on as I start this column, that I should be setting you up for the reviews in such a way? Well, we're winding up the Iraq adventure and embarking on an exercise in designing a new constitution and government to replace the Hussein tyranny. There are of course multiple interests to be consulted, and while we think the ideal new government would be a democracy, some of those interests have other ideas (such as an Islamic fundamentalist theocracy). Who will prevail? A good question.

We also have the SARS (Sudden Acute Respiratory Syndrome) crisis. The responsible virus belongs to the same family as those that cause the common cold, but this one can kill. It also causes alarm and panic, inhibits international travel, upsets cities such as Toronto whose economies depend on travel and tourism, closes hospitals, and sells loads of face masks, all with reason. If it can't be controlled, we have a problem, Houston.

First things first. In **Saturn**, Ben Bova picks up the tale of *Precipice* and *Rock Rats*, in which villainous Martin Humphries destroyed the founder of Astro Manufacturing and Pancho Lane moved from astronaut to Chairman of the Board. Finally Pancho has been able to thaw and cure her kid sister Susan. Unfortunately, freezing wipes memories. Susan had to be raised all over again. Now she is Holly, and she is all starry-eyed about Malcolm Eberly, an ex-con who is now the head of Human Resources for a space habitat named *Goddard*, which is about to haul a few thousand assorted misfits and dissidents out to Saturn to study the life on Titan and set up permanent housekeeping. Holly's going too, and she has grand romantic dreams.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Alas, Malcolm is a manipulator. All he wants is absolute power, and his masters are the same fundies who have taken over Earth. They don't want even misfits and dissidents to escape their control forever. They've been forced to agree that the folks on the *Goddard* will be able to write their own constitution and form their own government, but they have their people—including a couple of notable thugs—in place. They plan to control the constitution-writing process so that even though it may be a very liberal document, it will contain an "in case of emergency all civil rights can be suspended" clause. They also plan to get their own people (that is, Malcolm) elected to power, and it won't be long before an emergency is declared.

Poor Holly. Panting so hard after such a scumbag, right there listening when they talk about their plans, and not getting it. But she develops other friends—even romantic ones—and she does have some intelligence. A friend dies unexpectedly, and she finds a hint that it was murder. She says as much, and now she is a hunted woman.

Bova insists that democracy must prevail because tyranny is unstable. Considering how long some tyrannies have lasted, how many have ended only at the hands of annoyed neighbors or when the tyrant died of old age, and how few have actually collapsed under their own weight or because their masters have overreached, he is not convincing. He would have been well advised to omit such philosophical justifications for his story in favor of saying that when you send incompetents to do a job—whether it is building a Moonbase or setting up a dictatorship—the job doesn't get done.

His villains are incompetent? They are caricatures, *obvious* villains, as cartoonish as Martin Humphries (whose mustachios were visible even if nonexistent). Real villains hide their evil natures better.

Still, *Saturn* is an interesting reminder of what can go wrong in the constitution-writing, government-forming process. We can hope that it all turns out as well for Iraq.

It is also a reminder that even in an established democracy, people who care more about power and control can proclaim emergencies to limit or suspend civil liberties, as indeed seems to be happening here in the name of Homeland Security.

The last time we met Kristine Kathryn Rusch's "Retrieval Artist" series, it was with *The Disappeared* (reviewed here December 2002). In her future, humanity has forged treaties with a number of alien societies, agreeing that if humans offend against alien laws, on alien turf, they are subject to those laws. Ignorance of the law is no excuse, and if penalties seem draconian or bizarre, that's just too bad. So there are "disappearance agencies," which will, for a fee, help one leave an old identity behind—career, money, property, name, loved ones, history, and all—in order to start afresh, presumably beyond the reach of alien justice. There are also Retrieval Artists, who seek the Disappeared when legacies or other important matters arise, and Trackers, who hunt them down for the offended aliens. *The Disappeared* wound up with Miles Flint, a police detective on the Moon, becoming a Retrieval Artist.

And now Rusch gifts us with **Extremes**. The title has immediate meaning, for the opening scene is the Moon Marathon, run outside the dome in spacesuits. The initial viewpoint character is Coburn, a partner in an extreme sports travel agency, well started on the course until he rounds a boulder and stumbles over a body. Now bodies are common enough in the Moon Marathon. But most aren't dead. And this one is his partner and one-time lover, Jane Zweig.

Meanwhile, Tracker Miriam Oliviari has infiltrated the marathon's medical

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

teams. She's looking for a mass-murderer named Frieda Tey, who years before unleashed an engineered cold virus on a dome full of people. Her excuse was that she was sure that in sufficiently dire emergencies, people would rise above themselves in order to survive, and in an alien-dominated universe, it was necessary to learn how to make sure this happened. Unfortunately, everyone died and Tey Disappeared.

Miles Flint, just two weeks into his new career, gets a visit from a representative of a major law firm. It seems that one of their people died of a virus after supposedly finding Frieda Tey.

Noelle DeRicci gets the chore of dealing with the body of Jane Zweig. It doesn't take long for her to see that it was murder, start telling people not to leave, and begin the investigation process. And the runners finishing the course are developing the sniffles. In fact, one just died.

What's going on? All is not what it seems, but DeRicci is clever and insightful despite her reputation as a troublemaker, Flint is clever and persistent and able to move fast when the time comes, and Oliviari has suspicions about those sniffles and tries to communicate them. The hunt for truth and the struggle for survival move at a brisk pace and come to a bang-up conclusion. Once again, Rusch delivers a very readable and thought-provoking novel that satisfies the reader in just about every possible way. Buy and enjoy.

There is also, of course, that resonance with current events. SARS is a disease with a very discomforting kinship to the Tey virus. It is probably a perfectly natural variant; no one has seriously suggested that it owes its existence to a rogue "Tey" in some quiet lab. But . . . Natural or not, it must be dealt with in similar fashion: containment or quarantine, followed by a frantic search for an effective treatment. If that search succeeds, please note, it may also give us a treatment for the common cold and other viruses.

It's been just over three years since the last time Spider Robinson let us share the rollickin' good times of Callahan's Bar, that home away from home for the misfits and the weird, their wild punning contests, and their assorted adventures in world-saving. Callahan himself had to leave to save other worlds. Bereft, Jake Stonebender tried to revive the bar, but that lasted barely long enough for him to become the father of hypergenius (thanks to an internalized AI) Erin. In *Callahan's Key*, he led the crew on a wild exodus from Long Island to Key West, where they saved the world—heck, the Universe!—once more and promptly settled back down to enjoying life, good booze, and bad puns.

But trouble never ends. It merely takes a break, just long enough so we let our guard down. And as **Callahan's Con** opens, Field Inspector Ludnyola Czrjghnczl walks in, an emissary bureaucrat from the Florida Department of Education, there to check on the homeschooling of hypergenius Erin (who has been left to her own educating for the last dozen years, and has done quite well at it, thank you). She is clearly related to Jake's Long Island arch-enemy Jorjhk Grtozkdaheckwiddit, determined to declare Jake and Zoey unfit parents and remove the child.

Not that that would have been easy. After all, the kid can teleport and time-travel and think rings around just about any adult that has ever lived.

Which is a good thing. Because the next disaster is Tony Donuts Junior, a goon the size of a mountain with a brain the size of a molehill and a moral sense even smaller. He doesn't like your face, you don't have a face anymore. And if you don't take his protection racket seriously, you don't have anything to protect anymore.

Fortunately, he's ambitious, and when he sees Erin age 20 . . . age 16 . . . age 12

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

. . . age 6, he's ready to believe in Ponce De Leon's Fountain of Youth. Or "Ute," as Tony says it.

And if you want to see this con in action, you'll have to buy the book. As usual, good fun, a good read, and for a bonus you find out about District Attorney Tarara Buhm.

That's right. Tarara Buhm, D.A.

There's only one Spider.

It's probably just as well.

With the spring term over, it's time to reflect a bit: This time I got to teach physics for the first time, and I was reminded anew when we reached quantum theory how terribly bizarre that can seem. I actually had one intelligent fellow crying out, "No! No!"

That, of course, gave me the chance to point out that Einstein felt much the same way.

It also lets me segue into Robert Charles Wilson's **Blind Lake**, whose premise is that when the space-based telescopes started losing the images of distant worlds they had been built to catch, the O/BEC quantum computers designed to improve the fuzzy images kicked in—with a vengeance. Not only did they do their job, but when the telescopes failed entirely, they kept right on doing it—better!

And if that isn't quantum-bizarre enough, the O/BECs actually zoomed in on two planets to give detailed surface views. One wasn't terribly interesting—just water and muck and algae. But the other had cities and aliens, and the human scientists were utterly delighted. They could actually follow a single subject around to see what it saw, what it did, what it ate, and so on. An anthropologist's (xenologist's) dream.

The first O/BEC observatory was Crossbank, which focused on the first world. When the second entered the crosshairs, the Blind Lake National Laboratory was built in Minnesota, a dedicated community centered on the O/BEC units, peopled by administrators, researchers, and support staff, and surrounded by a security fence.

As Wilson's tale opens, three writers are approaching the fence. They are Sebastian Vogel, a retired academic who had the poor taste to write a popularly successful book titled *God & the Quantum Vacuum*, Chris Carmody, whose own book drove a well-known academic to suicide, and Elaine Coster, an acerbic journalist. They are there on behalf of a magazine, tasked to provide three takes on the O/BEC phenomenon. However, only moments after their arrival, the security lid goes on tight. Day workers are not even allowed to go home. Phone and email service stops. (Even cell phones? Sat phones? Never mind . . .)

Marguerite Hauser is a researcher who believes that intelligent species share enough concerns for their behavior to be understood. Her ex-husband is administrator and Grade-A prick Ray Scutter, who believes that intelligent species cannot possibly understand each other and that life is actually a stain on the Universe. Her daughter Tess has been cursed with an imaginary companion, Mirror Girl, and is having problems fitting in. When Chris Carmody is assigned lodging in Marguerite's basement, Ray throws a jealous fit.

And is that a hint that the subject, fifty light years away and presumably just as far in the past, is *aware* that it is being watched?

There is no clue to why the lab was sealed off from the outside world. But there is something funny going on. We know from the cover blurb that this is "a compelling thriller of alien contact," and so it is—but perhaps the aliens are not the obvious suspects.

Meanwhile, Chris and Marguerite are developing a great deal of interest in each other. They are both interesting characters, and they help the novel's appeal.

I enjoyed this one greatly. Go see why.

Brian Stableford's **Dark Ararat** is a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

disappointment.

The premise is interesting enough. In the twenty-first century, the global population and environmental crisis is threatening to destroy humanity. In earlier entries in the series—beginning with *Inherit the Earth* (reviewed here in February 1999), *Architects of Emortality* (March 2000), and *The Fountains of Youth* (October 2000)—Stableford described a gengineered plague of sterility, a technological solution, the development of nanotech and biotech modes of life extension, and their impacts on humanity. But before the ultimate crisis, several colony ships set out for the stars, carrying colonists in suspended animation, tended to by generations of crew. We met one such ship, which never managed to get out of the Oort Cloud, in *The Omega Expedition* (April 2003), set centuries later.

The *Hope* was more successful. It reached the world of Ararat (or Tyre, so named for its purple vegetation) in 2814 and began putting colonists ashore. Unfortunately, Ararat is not quite a clone of Earth. The local life can be processed into edibility, but its genetics is not based on DNA; indeed, it seems to have a dual genetic system. Individual life forms seem to be chimeras of multiple cell types, and there is no sign of seeds, eggs, or young on the entire planet. Is Ararat compatible with human life? Some think so, but others don't, and there is vigorous debate over whether they should all go back into suspended animation until the crew can find a better world. However, the crew's aims have diverged from those of the colonists. No way will they come back on board! And those still on ice will go down as soon as possible.

Finally, a research team has discovered the ruins of an ancient city. There are no signs of intelligent natives on the world, but the possibility only adds to the arguments for packing up and moving on. Worse yet, Bernal Delgado, the ecologist on that research team, has just been murdered with a weapon just like those the vanished natives made in their day.

Who did the dirty deed? One of Delgado's coworkers? An alien? The crew thaws out Delgado's backup, ecological prophet Matthew Fleury, and a detective, Vince Solari. Their mission is to figure out the crime and unravel mysteries. Once they're on the ground, Solari makes short and inconspicuous work of his part of the job. Fleury, however, used to be a public figure. He's used to center stage, he's an arrogant egotist, and he's smart. He's also an obnoxiously mouthy narrator, whether he's talking to other characters, himself, or the reader. He is Stableford himself in full lecture mode, which makes the book almost impossible to read.

The lectorial approach can work, but it needs to be broken up with much more action than Stableford provides here. Indeed, there is very little excitement before the last quarter of the book. That excitement is appropriate and it leads to a suitable conclusion, but it is far too long delayed.

As I said about *The Omega Expedition*, if you crave action, you probably won't enjoy this one. It's *not* a thriller.

I've noted before the explosion of activity in the Print-on-Demand (PoD) area. One of the major players here is John Betancourt's Wildside Press, which has provided a new outlet for collections, anthologies, and even novels the major publishers didn't want, brought new life to the backlist of living authors, and made available a torrent of older, public-domain titles. Sales are not huge for any one title, but they appear to be steady. In the last category, many are to libraries seeking to replace tattered shelf copies but individuals can buy too (of course!).

Are you a Jules Verne fan? Here's **The Green Ray** (1882), minor stuff, but Verne for all that, a quest for the green flash of light that occasionally accompa-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

nies the sunset and according to Highland legend has the power of dispelling falsehood.

Verne is more famous for many other tales, including *From the Earth to the Moon*, which is my way of saying that people have been fascinated by the Moon for a very long time and segueing into Dana Mackenzie's **The Big Splat: or How Our Moon Came to Be**. Mackenzie reviews the development of astronomy and lays out the history of our ideas of how the Moon was formed: Fission from a madly whirling Earth? Charles Darwin's son George liked that idea. Capture of a stranger passing in the night? Blame Thomas Jefferson Jackson. See, who was something of a scalawag. Joint coalescence from the primordial dust cloud? From Laplace to Chamberlin and Moulton and Safronov. And finally . . . God *does* like the odd game of billiards.

Some fifty million years after the Sun's fusion engine ignites, Earth is 90 percent of its present size, and another world, Theia, about a tenth the size of Earth, is orbiting nearby. But then the orbits intersect. Theia plows into Earth and disintegrates. Its molten iron core rains down on Earth, and the remaining rubble—including a fair-sized portion of Earth's surface—forms a ring in orbit. Within a short time, that rubble has coalesced to form the Moon. A hundred million years later, Earth has cooled down enough for rain to happen. In due time, life will appear, including life capable of looking up and asking, "How did that thing get up there?"

And if you have ever shaken your head over the nuts who claim we never really went to the Moon—it was all a fake, all special effects and lies—or had to argue with them, you'll be happy to see the appendix, where Mackenzie points out that the lunar rocks so fluently tell the tale of the Moon's fiery origin that they could not possibly have been faked. "They tell a self-consistent story with a complexly interwoven plot that's better than any story any conspirator could have conceived."

A very readable little book.■

We welcome your letters, which should be sent to Analog, 475 Park Avenue South, New York, NY 10016, or e-mail to **analog@dellmagazines.com**. Space and time make it impossible to print or answer all letters, but please include your mailing address even if you use e-mail. If you don't want your address printed, put it only in the heading of your letter; if you do want it printed, please put your address under your signature. We reserve the right to shorten and copy-edit letters. The e-mail address is for editorial correspondence *only*—please direct all subscription inquiries to:
6 Prowitt Street, Nowalk, CT 06855

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

BRASS TACKS

Dear Stan;

You began your June editorial, "A Time To Be Wrong," with a rather embarrassing mistake.

First, ". . . the cultivation of self-esteem as a primary goal of education." This is unexceptionable, and quite necessary. A novice practitioner of anything without the confidence to risk error and failure will be paralyzed.

In the second sentence, "The most important thing . . . is that students should be made to feel good about themselves . . ."

Come on! You know the rhetorical and logical difference between "a" priority and "the" priority! One of several, and before-all-others are very different.

Neil Rest
Chicago, IL

I certainly agree than an important goal of a teacher should be to help students earn *self-esteem, and the rest of that editorial made it quite clear, I think, that I appreciate the importance of making able and willing to risk error. My objection is to the tendency in some circles to make it the main priority—and I do mean* the *main priority—to make students feel good about their "accomplishments" whether or not they actually have any.*

Dear Mr. Schmidt:

I just read your article ("A Time to Be Wrong") and all I have to say is AMEN!

I once taught a self empowerment class that took three hours because the first hour and a half was warming up the students . . . and they weren't even being graded! It was for them to improve their voice through writing, not what they said in class!

It seems in this age of "perfection" no one is willing to take the risk of being wrong. Thank God some of our great authors, philosophers and scientists didn't go that route or we'd still be in the swamps. (See your sister publication, *Asimov's* for the reference to the swamps in Reflections by Robert Silverberg.)

Great article!

Cie Patterson

Dear Stan Schmidt,

I am a long time *Analog* subscriber and enjoy much of the cover and inside artwork as well as the stories and articles. I only glanced at the June 2003 cover before opening the issue and going to the late Lloyd Biggle's story "Of the Zornler, by the Zornler." I was immediately captivated by John Allemand's illustration—captivated and also intrigued as the setting seemed strangely familiar. Allemand has succeeded in dropping the viewer right inside the world of MC Escher. I assume the style is an homage—I find it in no way derivative but feel that it actually adds a dimension and immediacy to that Escher "otherworldliness." I then checked the cover illustration and found the characters depicted there to be more animated and colorful versions of Escher folk. Congratulations to John Allemand for his intriguing work—and to *Analog* for never failing to surprise.

Ross Sargent
Folkestone
Kent
UK

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Dear "Brass Tacks":

Considering the 6-month lead time to publication, it is *Astounding* how timely Lloyd Biggle's IPR story is, now that we are "imposing democracy" upon Iraq.

Stuart-Morgan Vance
Ashland, KY

Dear Stan,

I first want to congratulate Dr. Kirkland for writing another fine fact article, "Personalized Drugs." I have a slightly different take on the issue of the economics of the pharmaceutical industry that I want to share with *Analog* readers. Dr. Kirkland argues that pharmaceutical companies may not be very inclined to develop drugs for subsets of the population—those with a particular genotype. Based on the enormous developmental costs and the smaller potential market for such drugs, he fears that the economics of personalized drugs may be prohibitive. I disagree with this assessment; in fact, the economic factors may make personalized drugs a reality in the near future.

Almost all pharmaceutical companies have enormous collections of chemical compounds that they have developed that never received FDA approval. Many of these have even gone through clinical trials and were rejected for serious side effects in a small number of individuals. If it could be determined what genotypes are responsible for the negative side effects, then these "rejected" drugs could be taken right off the shelf and approved for use by individuals with the appropriate genotypes.

The beauty here is that the large development costs for these drugs have already been paid out and counted as a loss. Thus, any profits from these drugs will be—more or less—money in the bank. Sure, the costs of doing the genomic screening will not be trivial, but it will certainly be lower than the costs of developing new drugs from scratch. If the FDA ever adopts the practice of approving drugs for specific genotypes, I think that we will see numerous old drugs finally being approved. This should actually boost the profits of pharmaceutical companies and, one would hope, drive down the costs of medication in the long term.

M. Todd Washington, Ph.D.
Galveston, TX

The author replies . . .

Dr. Washington makes a very good point, and I have to admit that I hadn't thought of it earlier. What about drugs that have failed clinical trials because of adverse reactions in people with a certain genotype? If in the future, drugs are approved based on patient genotype, then these old failures may get resurrected. This optimistic scenario assumes, of course, that the only reason they failed was the adverse reactions of a few patients (i.e., we're assuming that the drugs were effective in nearly everybody else). I only hope that Dr. Washington is right!

Dear Stan,

In the June 2003 issue of *Analog*, on page 32, at the bottom of the second paragraph in the first column of his Science Fact article, "Personalized Drugs: The Future of Pharmacogenomics," Mr. Kirkland states:

"In fact the activity of quite a few drugs depends on one of its metabolites. Codeine, for example, is a commonly prescribed painkiller whose effects rely on the body's conversion of codeine to morphine."

Although I agree completely with the first sentence, I have serious doubts about the second.

My copy of Louis Lemberger & Alan Rubin's "Physiologic Disposition of Drugs of Abuse" (Spectrum 1976), on pages 138 & 139, in the section titled: "Metabolism of Drugs of Abuse—Morphine and Substitutes" states:

"Over 30 years ago, it was proposed

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

that the CNS depressant actions of codeine were dependent upon release of the 0-methyl group and the resultant formation of morphine; accordingly, then, morphine would account for the pharmacologic activity observed after a dose of codeine. In man, three pathways are primarily involved in codeine metabolism. These are N-demethylation to form norcodeine, 0-demethylation to morphine, and glucuronide formation. In general, N-demethylation occurs to a greater extent than does 0-demethylation. Within 24 hours after administration of codeine to man, urine contains morphine, conjugated norcodeine, and free and conjugated codeine (Adier, 1952; Mannering et al., 1954; Adier et al., 1955)."

"In man and rat, about 10% of an administered dose of codeine is converted to morphine, and several studies have demonstrated that this amount of morphine and the rate of its formation could not account for the onset, magnitude, and duration of analgesic effect after codeine administration. Furthermore, in the dog only 2% of a dose of codeine is converted to morphine. This small amount is reportedly conjugated about 10 times more rapidly than an equivalent amount of morphine injected into the animal (Paerregaard, 1958; Paerregaard and Poulsen, 1958). Therefore, if the actions of codeine in the dog were due to morphine formation, it has been calculated that about 500 times more codeine than morphine would be required to produce equivalent pharmacologic effects; the actual ratio of codeine to morphine required for such equivalence is less than 20. For these reasons (and others discussed in the 1960 and 1962 reviews of Way and Adier), it is difficult to accept the hypothesis that codeine has to be 0-dealkylated to morphine in order to produce its pharmacologic effects."

"In addition to N-methylation, 0-methylatioh of opiates can also occur (Elison and Elliott, 1964). Thus, in experimental animals the phenolic hydroxyl group of morphine has been shown to be susceptible to methylation both in vivo and in vitro, with the resultant formation of codeine. In man as well, codeine is formed from 0-methylation of morphine (Borner and Abbott, 1973). However, in at least one instance, the formation of codeine as a urinary metabolite of morphine in the rat was not confirmed (Abrams and Elliott, 1974). It is interesting that the methyl donor for this reaction does not seem to be methionine of S-adenosylmethionine as is typical for most reported 0-methylation reactions."

Since my profession is forensic toxicology, I would appreciate Mr. Kirkland's citation of references regarding his information in this matter.

And, should he need a possible example for future references on this subject, the inactive substance psilocybin and it's active metabolite, psilocin, would be a less controversial choice, IMHO .

Bob Weeks

The author replies . . .

I wondered if anyone would ask about this. Please note that I'm not a pharmacologist. However, I was well aware of research back in the 1950s which suggested that codeine's analgesic properties were not due to conversion to morphine. In fact, a 1970 book by Merck, titled *Codine*, expressed the same doubts that Mr. Weeks does in his letter. But let's fast forward 30 years. There are several papers in the current scientific literature, as well as a number of books, that strongly suggest that codeine's analgesic properties *are* due to its conversion to morphine. Basically, these studies indicate that conversion of codeine to morphine by CYP2D6 (an enzyme) is central to codeine's effects. References include the book *Drugs For Pain* by Howard S. Smith (2003; Hanley and Belfus); I quote from page 104: "There is increasing evidence that the analgesic effect of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

codeine is mediated by its O-demethylated metabolite morphine and the glucuronidated morhpine metabolite M6G." A paper by Klaus Eckhardt (which appeared in the journal *Pain* 1998, volume 76, pages 27-33) is cited as evidence. Another paper I've found which supports this claim is by Poulsen (*European Journal of Clinical Pharmacology*, 1996, volume 51, pages 289-95).

Dear Stan,

This week I was a judge for the International Science and Engineering Fair, which was in Cleveland this year. I judged two entries based on Philo T. Farnsworth's 1966 patent for a fusion vessel described by Tom Ligon in the December 1998 *Analog*.

No. I didn't remember it—both the projects listed the *Analog* article among their references!

I thought you (and maybe *Analog* readers) might be interested.

Gordon Aubrecht
Delaware, OH

Below is the description I sent to my colleagues:

Dear colleagues,

I had an interesting time judging at the International Science and Engineering Fair in Cleveland this Tuesday and Wednesday. Ralf Bundschuh, also from OSU physics, was there as well. We had about 60 judges in physics for about 70 projects. Everyone judged 9 projects in 15-minute stints, with breaks. I was impressed by how much better organized judging was than when we did it when the ISEF was in Columbus back in the 1980s.

Our lead physics judges were Lawrence Krauss and Julian Earles. I saw a great number of very impressive projects (and just a few not so great). I was most impressed by Mairied McCloskey's project on Couette-Taylor flow. Mairied is now a college student in Ireland (there is a year time lag for the non-Americans, so many have already graduated). She had read the classic papers by (our physics colleague Dave) Andereck and Swinney, and really understood them as far as I and the rest of the judges could tell. Gleick's *Chaos* book had sent her looking into the literature, and she was so fascinated she built an apparatus to test the results. Predictably, her homemade apparatus had great problems with tunability and accuracy, and she somehow talked the physics department of Cork University into building her a research apparatus—which she tested extensively and kept "fixing" (Cork reclaimed it and they are, she said, going to use it in their labs). Her results paralleled for the most part the classic results, but she said she was unable to reproduce their results in some of the regions the classics had claimed were definite. She showed interesting braids and twists intermingling where the classics had found definiteness (but I don't recall what). Anyway, at the end of the argumentation all the physics judges finally agreed that she should be named "best in category."

There were two first prizes awarded in physics, Mairied and another woman who had a biophysics project entitled "Is eating blueberry pie dangerous?" I did not judge the latter, but I believe Ralf may have.

I also saw two similar projects trying to follow Philo Farnsworth's 1966 patents and make fusion occur in a jar. One student, who was a mechanical /electrical genius (but no theorist or statistics expert) built his apparatus from scrap for under $20 (he did get the loan of a neutron detector, however; had he had to buy that, the cost would have been around $5k). He designed his high-voltage supply from scratch and used parts from scrapped microwave ovens. The other, one of the second prize winners, had read many, many articles in addition to constructing the apparatus (with help of Marshall Spaceflight Center, so it was semiprofessional). It was

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

amazing to be looking over the 40 or 50 articles from Phys. Rev. Letters, Phys. of Plasmas, etc., he had in his notebooks, marked up in ways similar to those I use to mark up articles—equations in pencil in margins, etc. He really knew the basis of what he was trying to do.

Anyway, it was an interesting experience I'd recommend. I visited the Stirling engine engineering team project by my colleague Brian McEnnis's daughter Kathleen and her teammate, but don't know where they placed. I'm sure I'll find out soon. ■

IN TIMES TO COME

Our next issue may be a bit of a surprise: it's another "double" like the July/August. We're rearranging our schedule, with a year still containing the equivalent of twelve "single" issues, but now distributed as eight singles and two doubles (January/February plus July/August) instead of the present ten singles and one double. That won't significantly change the total amount we offer you in a year, but it will significantly increase our flexibility in the *kinds* of things we can offer. In particular, the new schedule will make it easier to schedule more long novellas like last month's "Lucky Luke." It took some real finagling to shoehorn that into a regular issue, but it would have been no particular problem in a double.

George Krauter's dramatic cover illustrates "Inherit the Vortex," a new "Ray and Rokey" story by Ramona Louise Wheeler. One of the most ambitious tales in the series to date, this one gives us a look at Rokey's past, which includes a quite different sort of time-binding than yours or mine.

Thanks to the extra space, we'll also have quite a line-up of stories long and short by such well-known writers as Stephen L. Burns, Grey Rollins, Michael A. Burstein, Richard A. Lovett, and Robert J. Sawyer, plus a talented newcomer or two.

Our recent science fact articles have tended toward more or less biological topics, but next month Gary Lai takes us solidly back to physics and space with one tantalizingly titled "Hot-Air Ballooning Through Space: The Promise of Mini-Magnetospheric Plasma Propulsion."

Last but by no means least, remember that January—which now means "January/February"—is when we give you the annual index of everything we published in 2003, plus the ballot for The Analytical Laboratory—your chance to reward authors and artists for outstanding work and influence our future choices. Please vote!

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CLASSIFIED MARKETPLACE

Advertise in the world's leading science fiction magazines with our Analog/Asimov's combined classified section. Ad rates per issue: $2.95 per word (10 word minimum), $125 per column inch (2.25 inch maximum). SPECIAL INTRODUCTORY OFFER: Buy two ads and receive a third ad FREE. Send orders to: Dell Magazines, Classified Department, 475 Park Ave. S., 11th Floor, New York, NY 10016. Direct inquires to: (212) 686-7188; Fax (212) 686-7414 or email: classifiedads@dellmagazines.com

AUDIO/VIDEO

Audiobooks, Niven, LeGuin, Willis, Baxter, Egan, Sterling, Reed, Etc. www.audiotexttapes.com

Nova Audio. Scifi Short stories by Robert Silverberg, Sarah Hoyt, Cecilia Tan, & more. http://www.nova-audio.com/

BOOKS/PUBLICATIONS

$24,000 Cash/Prizes - POEMS WANTED, POSSIBLE PUBLICATION. POETRYAMERICA.COM

500 Science Fiction Paperbacks (400 Different) $625 post paid. 1000 Science Fiction Paperbacks (800 Different) $1250 post paid. 250 different Science Fiction Hardbacks (Book Club & Different Publishers) $495 post paid. All Books my choice. Great for libraries, schools, churches. You will order again! Same Prices for mysteries! Gardner's Used Books, 4421 S Mingo Rd, Tulsa, Okla 74146. 877-GBS-READ.

BUYING SCIENCE FICTION magazines, book collections. Will travel for large accumulations. Bowman, Box 167, Carmel, IN 46082.

CHRISTIAN SCIENCE FICTION print magazine and webzine. http://www.gateway-sf-magazine.com

Have your SF read to you. Download in seconds. www.privategalaxy.com

BOOKS/PUBLICATIONS

Learn the Truth
Little-known Facts Revealed

Sci-Fi & Fact zine Alternative histories
Free Catalog and Samples
P A C, PO Box 2523, San Anselmo, CA 94979
www.pacificareacomm.com 415-259-0118

PUBLISH YOUR BOOK ONLINE, Third Millennium Publishing, a cooperative of online writers and resources, http://3mpub.com

SCIENCE OF EMPOWERMENT. ACHIEVE PROSPERITY, ROMANCE, HAPPINESS. http://3mpub.com/barker/

www.rereadables.com. Online Used Book Store. Science Fiction, mystery and more.

MISCELLANEOUS

PTCIL - Plan and invest your way to Space. www.poweroftenclubintlltd.org

UNUSUAL ITEMS

Rebel against the Internet empires (MSN/AOL/Earthlink). http://www.elirion.net (888) 261-9995.

THE SPECIAL SCIENCE FICTION COMBINATION FREE AD OFFER

PLACE A CLASSIFIED AD IN OUR NEXT TWO ISSUES AND RECEIVE A THIRD AD FREE!

Your ad will reach a combined audience of 100,000 readers in our outstanding publications—**Analog and Asimov's** science fiction magazines.

Call today for a new rate card.

DELL MAGAZINES CLASSIFIED DEPARTMENT
475 Park Avenue South, 11th Floor, NY, NY 10016
Call: (212) 686-7188 ● Fax: (212) 686-7414
Email: classifiedads@dellmagazines.com

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

UPCOMING EVENTS Anthony Lewis

December is the slowest month for SF conferences, because it is effectively only two weeks long. Very little gets done during the last two weeks of the year.

5–7 December 2003

SMOFCON 21 (Conference for people who run SF conferences) at Embassy Suites, Rosemont, IL. Registration: $45. Info: SMOFcon 21, 707 Sapling Lane, Deerfield, IL 60015-3969, info@midfan.org, www.midfan.org/Smofcon.html.

12–14 December 2003

PHILCON 2003 (Philadelphia area SF conference) at Marriott City Center, Philadelphia, PA. Principal Speaker: Jack McDevitt. Artist Speakers: The Brothers Hildebrandt. Special Guest: Peter David. Registration: to be announced. Info: Philcon, Post Office Box 126, Lansdowne, PA 19050-0126, registration@philcon.org, www.philcon.org.

25 December 2003

POLECON (High Arctic SF conference). Cancelled because of security issues with flying reindeer.

2–6 September 2004

NOREASCON 4 (62nd World Science Fiction Convention) at Sheraton Boston, Marriott, and Hynes Convention Center, Boston, MA. Guests of Honor: William Tenn, Terry Pratchett, Jack Speer, Peter Weston. Registration: Attending USD160, Supporting USD35, Child USD105. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info: Noreascon 4, Post Office Box 1010, Framingham, MA 01701.FAX: +1.617.776.3243. info@noreascon.org www.noreascon4.org.

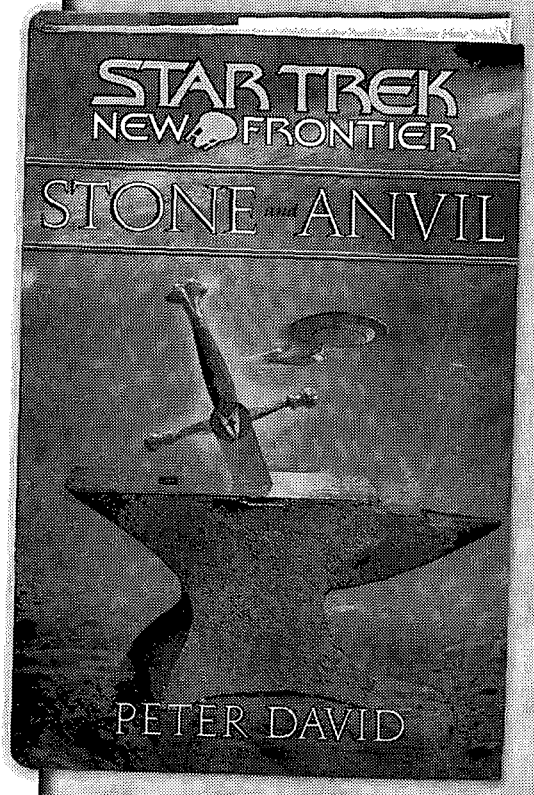
Running a convention? If your convention has a telephone number, FAX number, e-mail address, or Web page URL, please let us know so that we can publish this information. We must have your information in hand SIX months before the date of your convention.

Attending a convention? When calling conventions for information, do not call collect and do not call too late in the evening. It is best to include a S.A.S.E. when requesting information; include an International Reply Coupon if the convention is in a different country. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

FROM THE *NEW YORK TIMES* BESTSELLING AUTHOR OF *IMZADI*

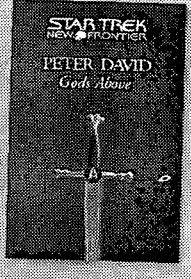
"David is a genuine master...and provides smart handling of *Star Trek* elements and a brisk story." —*Publishers Weekly*



Includes a bonus CD-ROM packed with all previous *New Frontier* adventures!

Join the continuing adventures of Captain Mackenzie Calhoun, Captain Elizabeth Shelby, and the crews of the Starships *Excalibur* and *Trident* in this unforgettable novel that explores the past of both captains—as they confront a deadly mystery in the present.

And don't miss these other thrilling *New Frontier* books—available in paperback!



Available wherever books are sold.
Also available as eBooks.

Visit **www.simonsays.com/st** and **www.startrek.com**

STAR TREK BOOKS
Published by Pocket Books
A Division of Simon & Schuster
A VIACOM COMPANY

Paramount Pictures

™, ®, & © 2003 Paramount Pictures. All Rights Reserved. STAR TREK and related marks are trademarks of Paramount Pictures. Pocket Books Authorized User.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CHILDREN OF DUNE
READ OUR EIGHT-PAGE EXCLUSIVE!

DAREDEVIL
AFFLECK VS. GARNER

Sci Fi

APRIL 2003
THE OFFICIAL MAGAZINE OF THE SCI FI CHANNEL

GO BEHIND THE SCENES
CHILDREN OF DUNE
MINISERIES SECRETS

STEPHEN KING'S DREAMCATCHER
TAKE A SNEAK PEEK
AT THE NEW FILM

FARSCAPE FAREWELL
THE CAST AND CREW
SAY GOODBYE

THE OSCARS
OUR SCI-FI PICKS

...DEOS, GAMES ... & MORE!

SAVE 50% OFF THE NEWSTAND PRICE
CALL 1-800-77SCIFI TO SUBSCRIBE
OR VISIT SCIFI.COM/SCIFIMAG

Sci Fi
THE OFFICIAL MAGAZINE OF THE SCI FI CHANNEL

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED